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ABSTRACT

The 16 papers in this collection explore the microcomputer revolution as it affects library information systems: (1) "HyperMedia/Multimedia Technology and New Opportunities for Libraries in the 1990s" (Ching-chih Chen); (2) "Use of CD-ROMs in West German Libraries" (David I. Raitt and Ching-chih Chen); (3) "Purposes of Interactive Optical Discs for Libraries and Their Users" (Rolf-Dieter Schmid); (4) "Microcomputer Applications in the Manuscript and Rare Book Collection" (Armin Hetzer); (5) "The Use of Hypertext for Orientation: The NCLIS (National Commission on Libraries and Information Science) Approach" (Susan K. Martin); (6) "The Use of LAN (Local Area Networks) in Improving Management and Services in an Academic Environment" (Mohammed M. Aman, Wilfred W. Fong, and Virgil Diodato); (7) "Micromation Prospects for Standards Libraries in Industrialized and Developing Countries" (Eberhard Janke); (8) "The Use of Microcomputers in Israeli Libraries" (Shmuel Sever and Yosef Branse); (9) "Integration of Microcomputers into a Mainframe Based Library System" (Ronald M. Schmidt); (10) "'Allegro': A New Database Concept for Micros (MS-DOS and UNIX)" (Bernhard Eversberg); (11) "Data Conversion Capabilities and Possibilities for Microcomputers" (Kate Noerr); (12) "A Scenario of OSI (Open Systems Interconnection) Based Library Cooperation" (Morten Hein); (13) "Microcomputers: Future Prospects for the Oxford Library System" (David J. Price); (14) "Microcomputers as Local Subsystems. Some Questions of Data Exchange" (Heinz Habermann); (15) "From Here to There and Back Again: Using Remote Session Microcomputer Software for Information Access in Libraries" (Erwin K. Welsch); and (16) "The Possibility of Displaying Special Characters and the Combination of Standard and Diacritical Characters in Microcomputers" (Reimer Auls). Also included are the conference agenda, lists of participants and vendors, and a summary of the conference by Ellen M. Pearson. (DB)

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Edited by
Ahmed H. Helal
Joachim W. Weiss

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Developments in Microcomputing - Discovering New Opportunities for Libraries in the 1990s

12th International Essen Symposium
23 October - 26 October 1989

Festschrift in honour of
Richard De Gennaro

Edited by

Ahmed H. Helal
Joachim W. Weiss

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12th International
Essen Symposium 1989
Essen University Library

Developments in Microcomputing - Discovering New Opportunities for Libraries in the 1990s

23 October - 26 October
1989

Preface

In October, 1989, more than 100 participants, speakers, and guests from 16 countries assembled in the Essen University Library for the 12th International Symposium. This year, the Symposium was held in honour of Richard De Gennaro, an internationally recognized authority on library and information technology and library management.

Mr. De Gennaro is Director of The New York Public Library, a position he assumed in 1987. Previous to this appointment, he was Director of Libraries and Adjunct Professor of English at the University of Pennsylvania, and Senior Associate University Librarian at the Harvard University Library. While at Harvard, he established the Library's automation program and initiated and directed the computer-based Widener Library shelflist conversion and publication project. Mr. De Gennaro is a Graduate of Wesleyan University, of Columbia University's Graduate School of Library Service, and of the Harvard Business School's Advanced Management Program.

Richard De Gennaro participates in a wide variety of professional activities. He is on the Board of Governors of the Research Libraries Group, Inc. and served as its Chairman in 1984-85. He was President of the Association of Research Libraries in 1975, President of ALA's Information Science and Automation Division, and Chairman of the ASIS Special Interest Group on Library Automation and Networks. He is the author of more than fifty papers and has completed over sixty consulting assignments.

A book of his selected papers was published in 1987 under the title of Libraries, Technology, and the Information Marketplace. He was awarded the American Library Association's Melvil Dewey Medal in 1986.

Mr. De Gennaro summarizes technological change in libraries over the last four decades as follows: "In sum, the major development of the 1950s was the use of micrography, that of the 1960s was the use of xerography and computers, that of the 1970s was online computer systems, telecommunications and networking, and that of the 1980s microcomputers and optical disk systems. The basic issue was and remains how to bring about a revolution in access to library resources by users. Technology is making the resources within a library available beyond its walls, and the resources beyond its walls available within the library". It is therefore appropriate that the theme of the 12th International Essen Symposium, held in Essen University Library from October 23-26, 1989, was "Developments in Microcomputing: Discovering New Opportunities for Libraries in the 1990s".

Microcomputers are no longer used only for word processing, database management, and spreadsheet calculations. They are now widely used in libraries because of their considerable computing power and applications. They are the foundations for CD-ROMs, hypertext, and interactive optical discs with enormous quantities of text information and coloured images. They have given many small libraries the opportunity to become involved in library automation.

Since all library operations can be run by microcomputers and large-scale computing facilities are no longer necessary, librarians will be forced to consider the implications of enhancing existing systems or acquiring new hardware and software. Librarians are facing new challenges and have to link their technological and subject skills to microcomputers and other technologies in use in their libraries. The continuous increase in microcomputer applications in libraries make it necessary to provide effective interfaces and linkages within one system and with other systems. Current telecommunication facilities allow linking microcomputers to a variety of information sources such as: local and distant online public access catalogs, bibliographic utilities, CD-ROM products, and online subject databases.

Linkages between local systems and networks should allow communication with each other. The Open Systems Interconnection (OSI) protocols under development by the International Organization for Standards (ISO) will be used to link local networks and these with regional and national networks. The European Commission is supporting this activity within its plan of actions to encourage European libraries for more cooperation. In the United States, the Linked Systems Project (LSP), initiated in 1981 by the Council on Library Resources, Inc., is underway.

The microcomputer revolution is a central object for any discussion about library automation. Only if librarians recognize the revolution that microcomputers have brought to every part of library operations they can take full advantage of microcomputers as a powerful force in future developments. All libraries are affected by the technical developments and the impact of microcomputers. All can participate in the benefits of this development. In conclusion, it is clear that new technologies and rapid developments in microcomputers with extraordinary capabilities will have an impact on certain aspects of cooperative networking, such as the extent of centralization. The issue in the 1990s will be how to integrate local extensions - local library systems - based on microcomputers into networks to expand their capabilities and exercise their usefulness to library users. In the 1990s the developments in microcomputers will add a powerful new dimension to networking.

The papers, concepts, ideas, and discussions presented during the 12th International Essen Symposium are articulate, stimulating, and relevant for librarians in the 1990s. We extend our thanks to all speakers, participants, and vendors who made the Symposium a success and who honoured our distinguished colleague, Richard De Gennaro.

Essen, January 1990

A. H. Helal
J. W. Weiss

Tuesday, 24 October

Chairman:	**Jürgen Bunzel**
9.30	Use of CD-ROMs in West German libraries **David I. Raitt and Ching-chih Chen**
10.00	Purposes of interactive optical discs for libraries and their users **Rolf-Dieter Schmid**
10.30	Discussion Coffee
11.15	Microcomputer applications in the manuscript and rare book collection **Armin Hetzer**
11.45	Discussion
12.00	Lunch break

Chairman:	**Susan B. Aramayo**
14.00	The use of hypertext for orientation: The NCLIS approach **Susan K. Martin**
14.30	Discussion Coffee
15.15	The use of LAN in improving management and services in an academic environment **Mohammed M. Aman**
15.45	Discussion Coffee
16.00	Online presentations
18.30	Reception

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Developments in Microcomputing - Discovering New Opportunities for Libraries in the 1990s

23 October - 26 October
1989

Agenda

Monday, 23 October

9.30	Registration
10.15	Online presentations
15.00	Opening of Symposium **Ahmed Helmi Helal**
Chairman:	**Ahmed Helmi Helal**
15.15	Hypermedia/multimedia technology and new opportunities for libraries in the 1990s **Ching-chih Chen**
16.00	Discussion Coffee
16.45	Online presentations
19.00	Reception

Wednesday, 25 October

Chairman:	**Look Costers**
9.30	Micromation prospects for standards libraries in industrialized and developing countries **Eberhard Janke**
10.00	The use of microcomputers in Israeli libraries **Shmuel Sever**
10.30	Discussion Coffee
11.15	Integration of microcomputers into a mainframe based library system **Ronald M. Schmidt**
11.45	Discussion
12.00	Lunch break

Chairman:	**Maurice Magnin**
13.30	"Allegro": A new database concept for micros (MS-DOS and UNIX) **Bernhard Eversberg**
14.00	Data conversion capabilities and possibilities for microcomputers **Kate Noerr**
14.30	Discussion Coffee
15.15	A scenario of OSI based library cooperation **Morten Hein**
15.45	Discussion Coffee
16.00	Online presentations
19.00	Reception

Thursday, 26 October

Chairman:	**Klaus-Dieter Lehmann**
9.30	Microcomputers: Future prospects for the Oxford Library System **David J. Price**
10.00	Microcomputers as local subsystems. Some questions of data exchange **Heinz Habermann**
10.30	Discussion Coffee
11.15	From here to there and back again: Using remote session microcomputer software for information access in libraries **Erwin K. Welsch**
11.45	The possibility of displaying special characters and the combination of standard and diacritical characters in microcomputers **Reimer Auls**
12.15	Discussion
12.30	Summing up **Ellen M. Pearson**
13.00	Close of Symposium

12th International
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XXXIII

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Essen Symposium 1989
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Developments in Microcomputing - Discovering New Opportunities for Libraries in the 1990s

23 October - 26 October
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Hypermedia/Multimedia Technology
and
New Opportunities for Libraries
in the 1990s

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Hypermedia/Multimedia Technology and New Opportunities for Libraries in the 1990s

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Abstract

"Multimedia" and "hypermedia" were the hottest buzzwords in 1988, but are realities now. Multimedia technology is not a single technology, but an integrated one that refers to a synthesis of text, data, graphics, animation, optical storage, image processing, and sound.

This paper provides a quick overview on the historical development of the hyper-text/hypermedia, and the role of hypermedia in today's dynamic information environment. Actual R&D examples in both PROJECT EMPEROR-I, specifically its hypermedia R&D component experimented on all major delivery system platforms, will be discussed and demonstrated, and new opportunities for libraries in the 1990s will be further elaborated.

3

Hypermedia/Multimedia Technology and New Opportunities for Libraries in the 1990s

1. Introduction

I am delighted to be in Essen again. Three years ago I presented PROJECT EMPEROR-I to all of you by using the remote control of a videodisc player and discussed the potentials of interactive videodisc technology in education, training and research. Three-year time period is a very long one from technological point of view, because it is one thirds of a decade in which there have been tremendous technological changes in every areas of information technology - computing, communications, and content. We have witnessed the advent of personal computers, worldwide packet networks, optical disc and other mass storage media, interactive video technology, image technology, computer graphic technology, and the growth both in size and number of massive public and private databases - bibliographic first, then numeric, and now multimedia. These three major areas were rather disparate in earlier years, but are becoming increasingly integrated and quite international in scope and impact. There is every reason to believe that this situation will continue, perhaps at an even faster pace, for the foreseeable future. Thus, this is indeed an interesting time to witness the integration of all types of technologies - old, new, and some yet to come.*

As the end of the 1980s is approaching its end, it is exciting to see the multimedia/hypermedia information delivery becomes a reality. Time does not permit me to cover all areas of new technological advances. Instead, I shall devote my time mainly to the area of multimedia/hypermedia, and the presentation will be given as outlined in the presentation package developed with a HyperCard interface specifically prepared for this Essen Symposium (Figures 1 and 2). As shown in Figure 2, at least four major areas will be addressed:

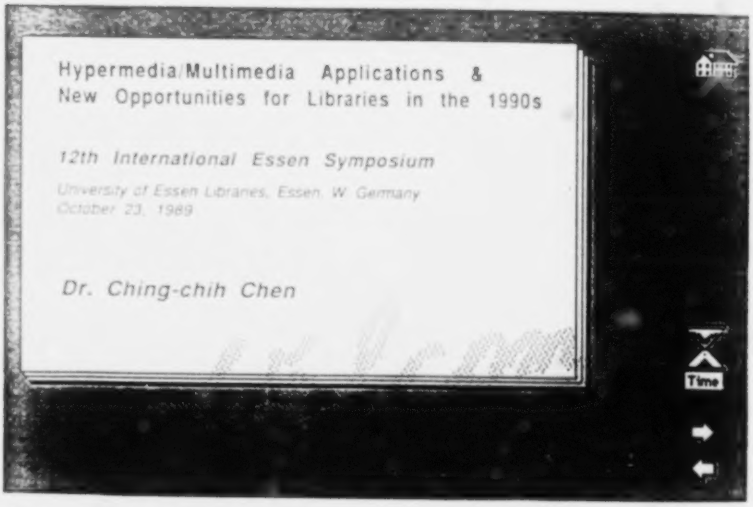
---

*This paper is a condensed and revised version as that given at the 2nd Pacific Conference on New Information Technology, Singapore, May 29-31, 1989 (1).

- Quick overview on the development of hypermedia/multimedia technology
- Major components of hypermedia
- Latest technological developments
- PROJECT EMPEROR-I's hypermedia applications.

2. Historical Development of Hypertext and Hypermedia

What is hypermedia? What is its conceptual foundation? What are the potential possibilities for using hypermedia in today's information environment? How can librarians and information specialists benefit from this development? In order to address these questions, let me start with a historical look on the development of hypertext and hypermedia, and then share with you experience gained from PROJECT EMPEROR-I, a R&D project in the use of cutting-edge technologies for hypermedia information delivery.



Hypermedia/Multimedia Applications &
New Opportunities for Libraries in the 1990s

12th International Essen Symposium

University of Essen Libraries, Essen, W. Germany
October 23, 1989

Dr. Ching-chih Chen

Figure 1. A Multimedia Presentation Package Developed for the Essen Symposium

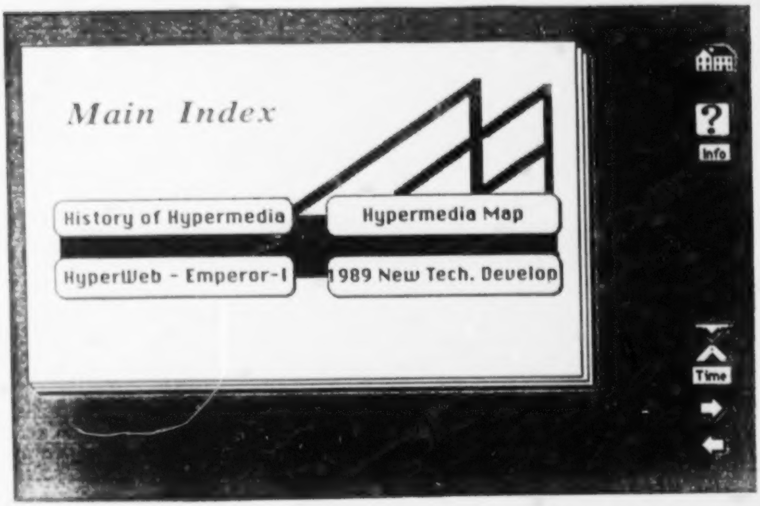
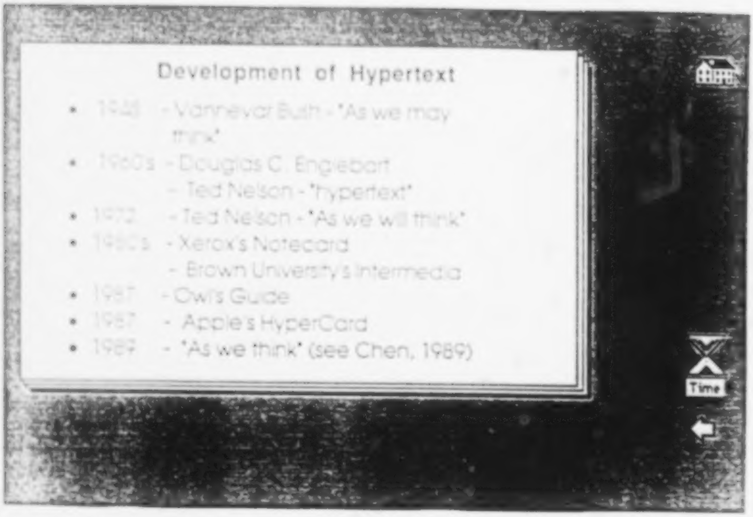


Figure 2. Four Major Areas Presented at the Essen Symposium

As shown in Figure 3, Vannevar Bush, a former science adviser to Franklin D. Roosevelt, projected in his famous article entitled **"As we may think"** published in the July 1945 issue of *Atlantic Monthly* (2) that "information overload" would be a serious problem, and there will be increasing difficulty for one to keep up with the latest knowledge in any given field. He described his "Memex", an electronic desk that could access any text of linking files within seconds. Although Memex was never actually developed, the foundation for a system now known as hypertext was laid.

Bush's idea endured and inspired two people about twenty years later in the 1960s - Douglas C. Engelbart of the Stanford Research Institute and Ted Nelson of Xanadu. Engelbart, influenced by Bush's vision, developed a system for knowledge workers, called NLS (oNLine System). NLS embodied many original ideas and concepts of hypertext, including windows, the mouse, electronic mail, and a hypertext-like ability to link and annotate documents (3). Nelson coined the word "hypertext" in the 1960s which he describes as non-sequential reading and writing which links different nodes of the text. His hypertext concept was published in his *Computer Lib/Dream Machines* in 1974 with an updated edition published by Microsoft Press in 1987 (4) and *Literary Machine* in 1981, with the 1987.1 edition published as the *GUIDE Hypertext Edition for the Macintosh* by Owl International Inc. (5). He also presented his ideas in a paper entitled **"As we will think"** at the Online Meeting in 1972.



Development of Hypertext

- 1945 - Vannevar Bush - "As we may think"
- 1960's - Douglas C. Englebart
  - Ted Nelson - "hypertext"
- 1972 - Ted Nelson - "As we will think"
- 1980's - Xerox's Notecard
  - Brown University's Intermedia
- 1987 - Owl's Guide
- 1987 - Apple's HyperCard
- 1989 - "As we think" (see Chen, 1989)

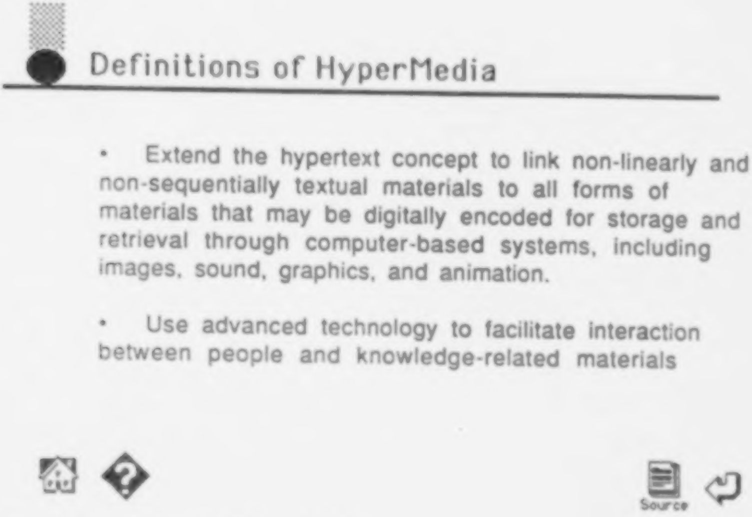
Figure 3. Milestones of Hypertext Development

With the advent of computer technology specifically the powerful workstation in recent years, Engelbart's work and Nelson's hypertext theory have encouraged several other hypertext projects. Among them, the largest are NoteCards developed at Xerox PARC and Brown University's Intermedia (6). In addition to research projects, commercial software program such as Owl International's Guide was introduced in the first half of 1987, followed by the flexible, powerful but easy-to-use HyperCard, introduced by Apple in the second half of 1987. Both programs draw heavily on the hypertext theories.

Since the introduction of Apple's HyperCard in late 1987, we entered a new chapter of hypertext/hypermedia information delivery. In a short two-year period, there is a quantum surge of interest in hypermedia applications. Indeed, behind the complex and quite confused HyperWeb environment, instead of accessing, retrieving, delivering, and utilizing print-based information only, the technological environment is ready now for us to be very demanding and aggressive in seeking needed information which is available in all forms and formats. In other words, we want to access easily and quickly the massive amount of multimedia information **as we think** (1). We are in a hypermedia age!

3. Hypermedia - Definition and Components

Hypertext refers to non-sequential reading and writing. Hypertext applications have thus far been limited to linking together textual/numeric information, and some small number of digital images. However, given today's computer technology, the logical extension is to contemplate the linking of all kinds of information sources (Figure 4). Instead of just text, users can link text, data, graphics, video, animations and voice together. Thus, hypermedia links textual material to all forms of material that may be digitally encoded for storage and retrieval through computer-based systems, including images, sound, graphics, and animation. Gaines and Vickers, in their introduction to hypermedia systems, illustrate the components of a system supporting hypermedia as modified in Figure 5 (7). CasaBianca in his gallant attempt to publish a hypertext-like journal, *HyperMedia*, graphically presents a typological framework of hypermedia in what he calls HyperMedia Map. He uses graphic icons, as shown in Figure 6, to illustrate how the world's communications media - audio, audio-visual, film, music, video - have been incorporated with computers, communications network, publishing and information resources, 3-D graphics, design, and system management to enable us to provide multimedia/hypermedia information in a new, global, "wired society" (8). Thus, when we talk about multimedia now, it refers to a synthesis of text, data, graphics, animation, optical storage, image processing, and sound. Clearly, multimedia technology is not a single technology, and there is no single product, or definable market. It epitomizes technology integration. In other words, it is a collection of technologies - some old, some new, and some yet to come - which are all integrated together to make the computers more powerful, but much easier to use and more relevant to the users' needs. Like pieces of puzzles fitting together, they make a story meaningful and a picture complete (9).



Definitions of HyperMedia

- Extend the hypertext concept to link non-linearly and non-sequentially textual materials to all forms of materials that may be digitally encoded for storage and retrieval through computer-based systems, including images, sound, graphics, and animation.
- Use advanced technology to facilitate interaction between people and knowledge-related materials

Figure 4. Definitions of HyperMedia

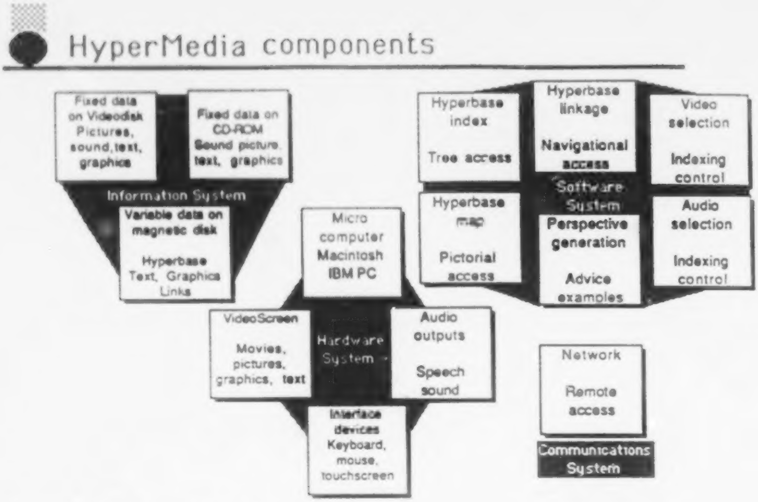

HyperMedia components
Fixed data on Videodisk Pictures, sound, text, graphics
Fixed data on CD-ROM Sound picture, text, graphics
Information System
Variable data on magnetic disk
Hyperbase Text, Graphics Links
Micro computer Macintosh IBM PC
VideoScreen
Movies, pictures, graphics, text
Hardware System
Audio outputs
Speech sound
Interface devices Keyboard, mouse, touchscreen
Hyperbase index
Tree access
Hyperbase linkage
Navigational access
Video selection
Indexing control
Software System
Hyperbase map
Pictorial access
Perspective generation
Advice examples
Audio selection
Indexing control
Network
Remote access
Communications System

Figure 5. HyperMedia Components

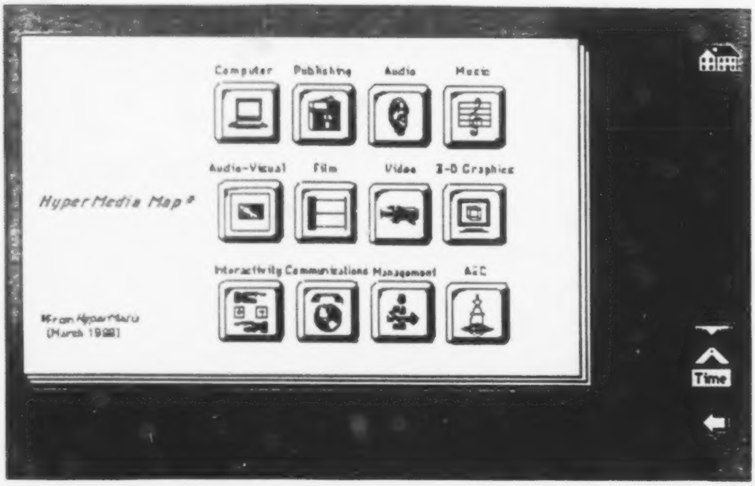
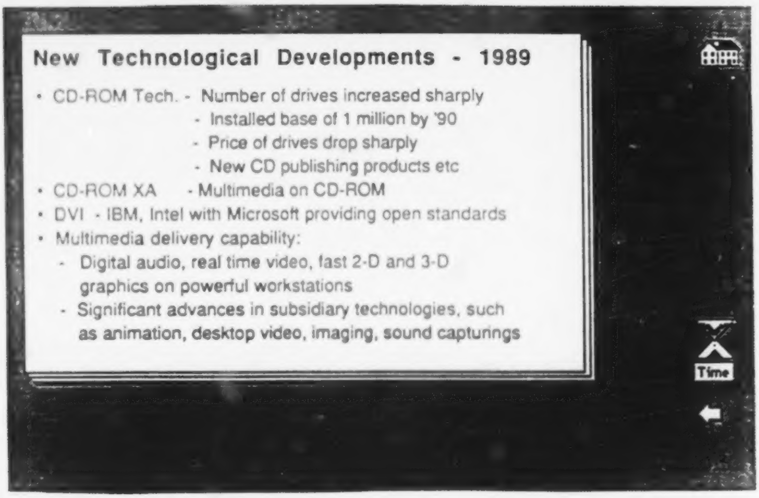

Computer
Publishing
Audio
Music
Audio-Visual
Film
Video
3-D Graphics
HyperMedia Map
Interactivity
Communications
Management
A&C
From HyperMedia (March 1988)
Time

Figure 6. HyperMedia Map

4. New Technological Development in 1989

In the last two years alone, numerous types of information technologies have become available to provide not only text and data information, but also photograph-quality images, animation, good-quality sound, and more importantly, interactivity and connectivity. The array of technologies utilized include microcomputer and minicomputer technologies; optical storage technologies including CD-ROM, analog videodisc, WORM, and erasable; scanning and digitization technologies; computer graphics; communications technologies; etc.

A closer look at the developments in 1989 reveals many exciting advances as outlined in Figure 7. In the CD-ROM technology area, the rate of increase in both the number of drives installed and the number of CD-ROM products available continue to grow steadily. New products and techniques for pre-mastering and producing CD-ROM discs are also available to reduce entry costs for both software developers and CD-ROM database producers and vendors. In the last quarter of 1989, the first multimedia CD-ROM product, *The Guiness Book of Record,* was introduced by Pergamon Compact Solution, Inc. One other step of pushing CD-ROM technology to areas of multimedia is the introduction of CD-ROM Extended Architecture (CD-ROM XA) by Microsoft and Sony. This standard enables the inclusion of FM-quality audio together with a small video window on a standard CD-ROM. In other areas of multimedia applications, development tools have been introduced for DVI (Digital Video Interactive) applications and a critical mass of CD-I (Compact Disc-Interactive) titles are being developed for 1991 introduction. Clearly all these point to a very prosperous future in the area of multimedia.



New Technological Developments - 1989

- CD-ROM Tech. - Number of drives increased sharply
  - Installed base of 1 million by '90
  - Price of drives drop sharply
  - New CD publishing products etc
- CD-ROM XA - Multimedia on CD-ROM
- DVI - IBM, Intel with Microsoft providing open standards
- Multimedia delivery capability:
  - Digital audio, real time video, fast 2-D and 3-D graphics on powerful workstations
  - Significant advances in subsidiary technologies, such as animation, desktop video, imaging, sound capturings

Figure 7. New Technological Developments in 1989

5. PROJECT EMPEROR-I'S Hypermedia Application

Having provided the above overview on hypermedia, I shall give a case presentation and demonstration on the PROJECT EMPEROR-I's major R&D hypermedia application, which is one of the several components of the project. A recent detailed introductory account of this application can also be found in the March 1989 issue of *Academic Computing* (10) and the June 1989 issue of *Microcomputers for Information Management* (1).

5.1. Background Information on PROJECT EMPEROR-I

PROJECT EMPEROR-I, supported by the Humanities Project in Libraries, US National Endowment for the Humanities (NEH), started in late 1984. It started as an R&D project which applies the latest in hybrid microcomputer and videodisc technologies in presenting and interpreting one of the most important and early historical/archaeological periods in China. The site and artifacts recorded and presented are from the period of the First Emperor of China, about 2,200 years ago.

PROJECT EMPEROR-I is intended to bridge the gap between the East and the West, the past and the present, humanities and high tech, and scholarship and applications. New information technologies have the capability to deliver large amount of multimedia information quickly, easily, and differently from those available in more traditional sources. Because of this, PROJECT EMPEROR-I demonstrates convincingly that new technology indeed can be used to promote better general understanding and appreciation of the humanities by providing the information seekers the opportunity to gain subject knowledge through accessing, enjoying, and digesting the online electronic **multimedia** information at their own pace and choice, and at the point of need.

Since the completion of "The First Emperor of China" videodiscs in the summer of 1985, because of the radical advances of the hybrid microcomputer and optical technologies, and their associated technologies such as computer graphics, scanning technology, etc.-in the last four or five years, this project has moved far beyond the objectives and activities from what was originally expected and imagined in 1983-4.

5.2. Project Products and Activities

PROJECT EMPEROR-I is a technology integration project, which utilizes a combination of many technologies - new, old and hopefully those yet to come. Since it is an R&D project, it is not intended only for one type of delivery platform. Thus, the following major project products and activities will show that developmental work has been done or experimented on almost all delivery platforms - MS-DOS systems for IBM PC and compatibles, Macintosh, Sun mini-computer, Digital Equipment Corporation microcomputers such as Professional 350 and MicroVAX. As time goes on, some applications are no longer functional due to obsolescence. For example, while gaining invaluable experience in the development of prototype interactive courses on DEC IVIS, those applications have been superseded by our hypermedia applications on Mac II. The major products and activities include:

(1) *The production of videodiscs* - a set of two 12" NTSC CAV videodiscs, entitled "The First Emperor of China: Qin Shi Huang Di, 秦始皇帝 " was produced in 1985;

are presented and interpreted to the users through interactive media technologies. In that, the current hypermedia application on Mac II will be highlighted.

5.3. PROJECT EMPEROR-I's Hypermedia Courseware

Our earlier attempts to deliver multimedia information on DEC's IVIS was only the beginning. Multimedia applications are being experimented at both DEC's MicroVAX under the MUSE system, and Sun 3-160. DEC's MicroVAX uses a high-end microcomputer while Sun 3-160 is a powerful minicomputer. These system configurations are comparatively quite expensive when compared with PC-based systems and are really intended for high-end users who can afford more expensive systems.

In order to encourage those with less resources, PROJECT EMPEROR-I demonstrates convincingly that powerful, flexible and user-friendly hypermedia applications can be developed on less expensive delivery platforms such as Apple's Mac SE and Mac II. With the support of both the Multimedia Group of Apple Computer, Inc., and thanks to Bill Atkinson's HyperCard, we have used HyperTalk to develop our own hypermedia interactive courses, under the general title "The First Emperor of China: A HyperMedia Application", under the HyperCard environment. We have been able to take full advantage of the rich and enormously large multimedia information bank stored on the set of two videodiscs - moving video, still picture, audio in dual English and Chinese languages, music, descriptive text, primary expert commentary and interview sources - as well as the large textual and database information stored on microcomputer. For the first time, we are able to deliver any of the chosen multimedia information, **as we think,** at speeds not previously possible, generally no longer than half a second after we click the mouse on the chosen icon. It is a true seamless environment where, behind the transparent HyperWeb environment, a system user can gather and link information easily from different storage media and sources to obtain his or her own desired information package, without feeling the pain and frustration of searching for information or waiting to obtain them.

5.3.1. Modules

Figure 8 is the Home Card of our HyperMedia Guide which will open the door for us to the "knowledge base" on The First Emperor of China just

(2) *The development of interactive multimedia courseware* for both general public and students and researchers include:

- Prototype courses for DEC's IVIS systems
- Sample courses for IBM compatible PC systems
- Hypermedia applications on Macintosh, including the latest Mac IIs. Both English and Chinese versions have been developed
- Multimedia application on DEC MicroVAX is being experimented in cooperation with Project Athena at the Massachusetts Institute of Technology

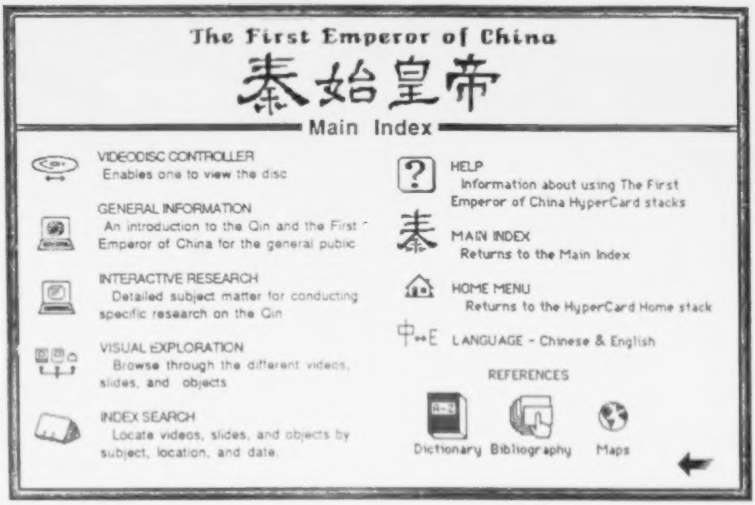
(3) *The creation of electronic image databases*

- Using Image Concepts' C-Quest for IBM compatibles
- Cooperating with SOPHIATEC of Nice, France in using SOPHIADOC for IBM compatibles
- Using HyperTalk in developing in-house image database system for Mac II
- Using Image Understanding System's OASIS Software for Sun Microsystems' Sun 3-160 minicomputer

(4) *High-resolution image digitization and electronic imaging* - This application is being developed on a Sun 3-160

(5) *Converting/creating large textual files and scanning/digitizing images* - Using MicroTek's MSF-300G image scanner, INOVATIC's optical character recognition software, ReadStar II Plus, and VersaScan software.

Each of the above activities is developed to fulfill and/or demonstrate for a certain purpose. Due to the dynamic nature of new technological development in the last couple of years, several current activities and products of the project were not even included in the original proposal in 1983. Undoubtedly, as new technology evolves, more new activities are expected to be forthcoming. Clearly, from the types of hardware and software mentioned above, PROJECT EMPEROR-I has integrated the use of all types of technologies whenever they are needed. These include both microcomputer and minicomputer technologies, object oriented software engineering, image technology, scanning technology, optical technologies - videodisc, WORM, and CD-ROM. In the following section, discussions will concentrate on the content of the project and how they



The First Emperor of China

秦始皇帝

Main Index

VIDEODISC CONTROLLER
Enables one to view the disc

GENERAL INFORMATION
An introduction to the Qin and the First Emperor of China for the general public

INTERACTIVE RESEARCH
Detailed subject matter for conducting specific research on the Qin

VISUAL EXPLORATION
Browse through the different videos, slides, and objects

INDEX SEARCH
Locate videos, slides, and objects by subject, location, and date.

HELP
Information about using The First Emperor of China HyperCard stacks

MAIN INDEX
Returns to the Main Index

HOME MENU
Returns to the HyperCard Home stack

LANGUAGE - Chinese & English

REFERENCES

Figure 9. The Main Index Card of The First Emperor of China's Hypermedia Application

● The **General Information** courses are designed for the general public and school children. When a topic, for example, "Introduction to Qin Shi Huang", is clicked or chosen, the browser will take the system user immediately to a video card, and the relevant video will start immediately to provide a 5-minute introduction to the Emperor. As the video is going on, the system user is able to browse the textual information displayed on the computer monitor, manipulate the video showing, or to ask for additional information, such as an interview with a subject expert on the chosen topics, relevant slides on the subject, and additional textual information. In addition, one is able to either print or make notes on any thing **as one thinks.**

● The **Interactive Research** module, similar to that of the General Information module provides courses modelled after an extensive two-semester graduate study course outline prepared by our subject consultant. Each subject topical area consists of several levels of subdivisions. Each topic is presented with one, two or all of the three like we are entering the entrance to the Museum of Qin Terracotta Figures of Warriors and Horses in Xian and can expect to see the grandeur of the magnificent terracotta army of the Emperor. As we click on the arrow sign, the Main Index (or Contents of the knowledge base) will appear as shown in Figure 9. There are several modules, each of which can be accessed by a simple click of the mouse. The heart of our hypermedia application is our interactive multimedia courses which can be accessed at the following two levels:

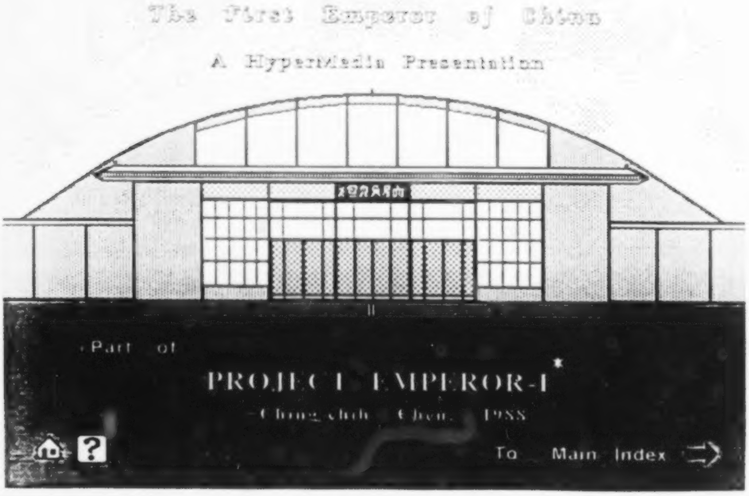

The First Emperor of China
A HyperMedia Presentation
Part of
PROJECT EMPEROR-I*
Ching-chih Chen, 1988
?
To Main Index

Figure 8. The Home Card of The First Emperor of China: A HyperMedia Application

types of information sources - textual information, visual (slides or videos), and interviews. When slides are chosen, database information and descriptions of the slides together with information sources can be retrieved easily as well.

Other modules include the following:

- **Videodisc Controller** enables one to retrieve the visual information on the disc at Level I interactivity (this means that one is able to play the video at normal speed, or to scan faster or slower, or to go forward or backward one frame at a time).

- **Visual Exploration** enables one to quickly and easily explore the still and video images, and also obtain videos with zooming-in, zooming-out, and rotating effects.

- **Index Search** is essential for obtaining database, description, and related textual information on any given still image or moving video segment. There are six ways of searching - by date (of object or of discovery), by location (current location or discovery location), by type of material, by source of information, by subject, or by a combination of them. The Subject Index essentially maps out the hierarchical structure of the entire subject. Each subject concept can be further subdivided and/or described by a "modifier" or "descriptor". For example, the picture of a kneeling archer which is a close-up with front view is certainly different from that which has a back view and only the close-up of the upper body. In other words, our subject search system is designed and developed to enable retrieval of desired images with much greater precision and relevancy.

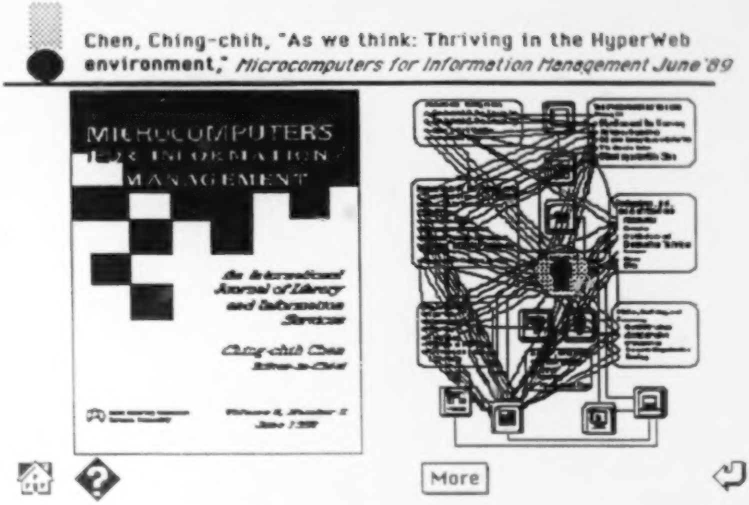
Aside from these modules, commonly applicable to all searchable information are the "References" which can consist of all types of reference tools available in a library. We have chosen only three at this time for prototype development and demonstration. It is our believe that if three can work smoothly in the system, then any number of types of sources available in the library can be accommodated as well. These three types are:

- Dictionary
- Bibliography
- Maps.

For Bibliography, not only relevant bibliographic citations are given, but also full text retrieval can be performed immediately, provided there is no copyright difficulty. For Maps, they are available from macro-geographical maps of an area to the zoom-in plan of the site showing the line up of the 7000 terracotta figures, and images of any given part of the plan can also be immediately retrieved together with the associated information.

5.3.2. The System's HyperWeb Links

The system is transparent to users who can truly access quickly and painlessly the massive amount of multimedia information, gathered and synthesized together. The non-sequential browsing, reading, and writing which Nelson envisioned have indeed been achieved. The simpler and more user-friendly the system is for users, the more complex the links among different nodes of texts, files, images, and audios are. Take the Interactive Research module as an example, we have developed seven courseware for the students and professionals in this subject field. The knowledge base is arranged in a hierarchical structure, with each broad subject topic (which is considered a course in our project) further subdivided in numerous sub-, sub-sub-, and sub-sub-sub-sections whenever appropriate. Thus some topics may have five levels of sub-sections. Figure 10 shows the much simplified links from one major subject topic to the other in using our hypermedia system. When we go down one level of sub-divisions under topic, the complexity of the HyperWeb links increases sharply as illustrated in Figures 11 and 12. One can imagine what the web would look like when it is truly representative of the current course structure with multiple levels of divisions under each topic.



Chen, Ching-chih, "As we think: Thriving in the HyperWeb environment," *Microcomputers for Information Management June '89*

MICROCOMPUTERS FOR INFORMATION MANAGEMENT
An International Journal of Library and Information Services
Ching-chih Chen
Editor-in-Chief
More

Figure 12. HyperWeb Links as Described in the *Microcomputers for Information Management*

6. Implications for Libraries and Information Centers

PROJECT EMPEROR-I's hypermedia application illustrates how new information technologies, when integrated together, can not only effectively present and interpret any subject topics, even difficult ones in the field of art history and archaeology such as the stunning site of the Emperor's terracotta army and horses, but also provide immediate access to multimedia information despite the various barriers such as time and geographical distance in a way never possible before. It can also permit the free and immediate exploration of the fascinating ancient treasures which otherwise could only be viewed on site. Although this project is related to an art history and archaeological subject, the experience gained from the project in terms of an integrated use of

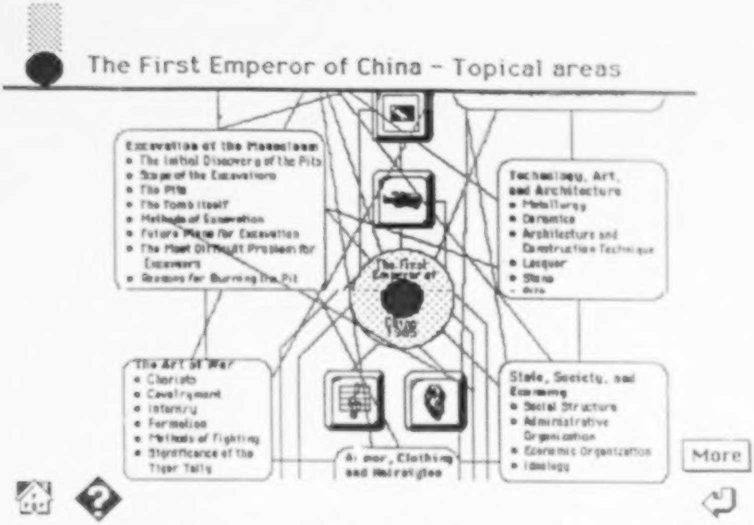

The First Emperor of China - Topical areas
Excavation of the Mausoleum
The Initial Discovery of the Pits
Scope of the Excavations
The Pits
The Tomb Itself
Methods of Excavation
Future Plans for Excavation
The Most Difficult Problem for Excavators
Reasons for Burning the Pit
Technology, Art, and Architecture
Metallurgy
Ceramics
Architecture and Construction Technique
Lacquer
Stone
The First Emperor of China
The Art of War
Chariots
Cavalrymen
Infantry
Formation
Methods of Fighting
Significance of the Tiger Tally
State, Society, and Economy
Social Structure
Administrative Organization
Economic Organization
Ideology
Armor, Clothing and Hairstyles
More

Figure 10. Macro-Links among Interactive Research Course Topics in the System

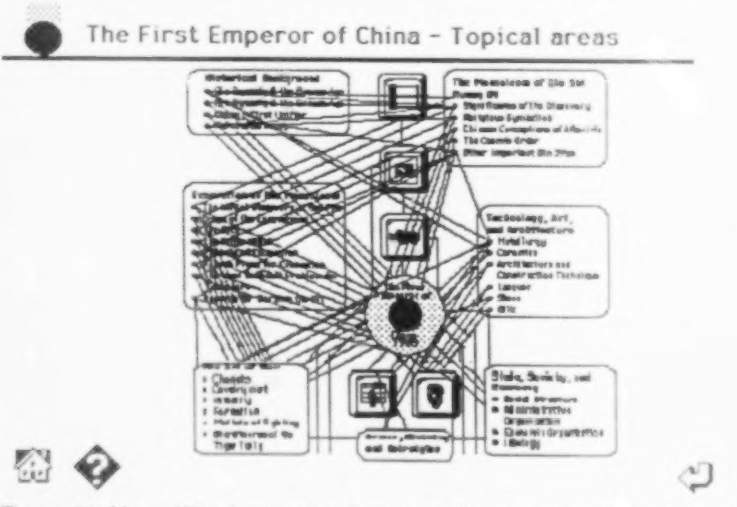

The First Emperor of China - Topical areas
Historical Background
The Mausoleum of Qin Shi Huang Di
Significance of the Discovery
Religious Symbolism
Chinese Conceptions of Afterlife
The Cosmic Order
Other Important Qin Sites
Technology, Art, and Architecture
Metallurgy
Ceramics
Architecture and Construction Technique
Lacquer
Stone
Silk
Chariots
Cavalrymen
Infantry
Formation
Methods of Fighting
Significance of the Tiger Tally
State, Society, and Economy
Social Structure
Administrative Organization
Economic Organization
Ideology
Armor, Clothing and Hairstyles

Figure 11. HyperWeb Links with One-Level Sub-Division of the Subject Topics

technology for information-related problem solving, and the implementation process are transferrable to all subject fields, including science, technology and medicine.

PROJECT EMPEROR-I also presents a philosophy on information access and delivery. As demonstrated, technologies are available for us to consider hypermedia information delivery, which goes far beyond the traditional ways of delivering only print-based information. Clearly, technologies are tools to enable us to enhance information access. Thus, we should learn, depending on the information-related problem at hand, how to use them effectively rather then being used by them. The purpose determines the value of a given project, not just the types of technologies used. Hypermedia applications are not geared for large libraries only. In fact, in a small library or learning resource center, there are many small-scale projects related to information needs, in which hypertext/hypermedia applications are not only relevant but also most productive.

7. Conclusion

PROJECT EMPEROR-I's integrated use of new information technology has provided researchers, students, and the general public with a dynamic system for immediate access to multimedia information. As an R&D project, it thrives in the current HyperWeb environment. In the short four-year period, it has evolved in many activities and projects which were not even included in the original proposal submitted in 1983. "This is because we are dealing with cutting-edge technologies which are indeed moving targets. Standing on a fast moving sidewalk, we see new technological tools come and go swiftly. Thus technologies are not really important. The overriding concern should be whether we are able to utilize the available new technological tools effectively to enhance information access. PROJECT EMPEROR-I has demonstrated that every individual's information need, regardless whether s/he is researcher, scholar, student or layman, is important and deserves our consideration. Thus, we have developed various R&D products to meet the diversified needs of information seekers. In order to maximize the potential use of these products, they are also developed for multiple delivery platforms".

"PROJECT EMPEROR-I is a good example to show that one can develop a project which can stand the test of time without the danger of obsolescence. With the rich source materials - stored either on videodiscs, in machine-readable forms on computer tapes, hard disks, or in hardcopy formats - we shall continue to build on what we have now and expand the scope beyond it. Undoubtedly, we shall utilize whatever new evolving technologies and techniques there are to enable us to broaden our horizon. Thus, in a very confused and exciting technological environment, we view the future with great enthusiasm. The future holds great promise for information professionals!"(10)

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Use of CD-ROMs in West German Libraries

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Abstract

A study was carried out in public, academic, special and government libraries and information centres in Western Europe during 1989 on the use of CD-ROMs and optical products. The background to the study is summarized and some initial results from the survey as they relate to the situation in West German libraries are presented and discussed. It is evident that optical products in general and CD-ROMs in particular are not yet in widespread use in these libraries.

Use of CD-ROMs in West German Libraries

1. Introduction

A survey on the use of CD-ROMs and other optical products in public, special, academic, government and other types of libraries as well as information and documentation centres in eighteen Western European countries was carried out during the first nine months of 1989. The survey was based on a questionnaire distributed in 1987 and 1988 to all types of library in the United States of America (1). Preliminary results of the European survey have been presented elsewhere (2) and more detailed results, analyses and comparisons are in press (3,4). What this paper sets out to do is to analyse the results in more depth for libraries and information centres in West Germany and to compare these results where relevant with the overall total European response as well as those from individual countries.

The study was carried out under the auspices of FID (Federation Internationale d'Information et de Documentation) with partial funding from the CEC (Commission of the European Communities - DGXIIIB) for the twelve countries of the European Economic Community. For completeness, Austria and Switzerland were also included in the survey and NORDINFO, who were sponsoring a similar survey in the five Nordic countries, agreed to use the same questionnaire for Finland, Iceland, Norway and Sweden and distribute it in Denmark on behalf of FID.

Since the questionnaire would go to many different countries, it was translated into the major European languages (ie French, German, Spanish and Italian - as well as English) in an attempt to maximize the return. Covering letters in these languages were also distributed along with the questionnaire. The German questionnaire and covering letter were sent not only to libraries in West Germany, but also to libraries in Austria, Luxembourg and Switzerland.

The latest (9th) edition of the Saur World Guide to Libraries was used as the primary source for obtaining the names and addresses of the European libraries. Initial distribution of questionnaires started in week 4 of 1989 for the Nordic countries and week 10 for most of the other countries and was completed in week 25 for West Germany. The latter country had by far the highest number of individual libraries listed - although a fair number were erroneous and/or duplicated under different forms of the name. Virtually every institute or department of a West German university, for instance, was given an individual entry in the Saur directory, although this was not the case for other countries.

Returned completed questionnaires were initially coded in The Netherlands after which they were photocopied and then sent to the United States for verification and computer input by graduate students. The statistical program used for the subsequent analysis was STATPAC GOLD.

2. Analysis of West German Libraries Returns

2.1 Use of Optical Products in West German Libraries

Table 1 gives a breakdown of the number of questionnaires mailed out to all libraries and subsequently returned. As can be seen, out of a total of 13,568 questionnaires distributed to libraries and information centres throughout Europe, 3317 were mailed to West German libraries (i.e. almost one quarter of the total and over one quarter for EEC countries) and of these 917 (28%) were returned. This compares to 7% for Italy (the lowest) and 64% for Denmark (the highest - after a follow-up). Since the total return from all eighteen countries was 3130, the West German returns represent 29% of the total return. On the other hand, the West German returns account for a massive 39% of the responses from EEC countries.

Of those 917 questionnaires returned by West German libraries only 36 (4%) responded they were already actually using optical products (and these were exclusively CD-ROMs). This was one of the lowest responses reported - in fact, out of all West European countries only Norway (3%), Portugal (2%) and Greece and Luxembourg (both 0%) had a lower use of CD-ROMs. This compares to 20% of the British libraries who reported they were using optical products (Fig 1). In other words, 96% of those West German libraries replying were not yet using either CD-ROMs, videodisks or other forms of optical disks and presumably the picture is much worse since one could perhaps assume that those who did not return the questionnaire (which was in German) were not using optical products either.

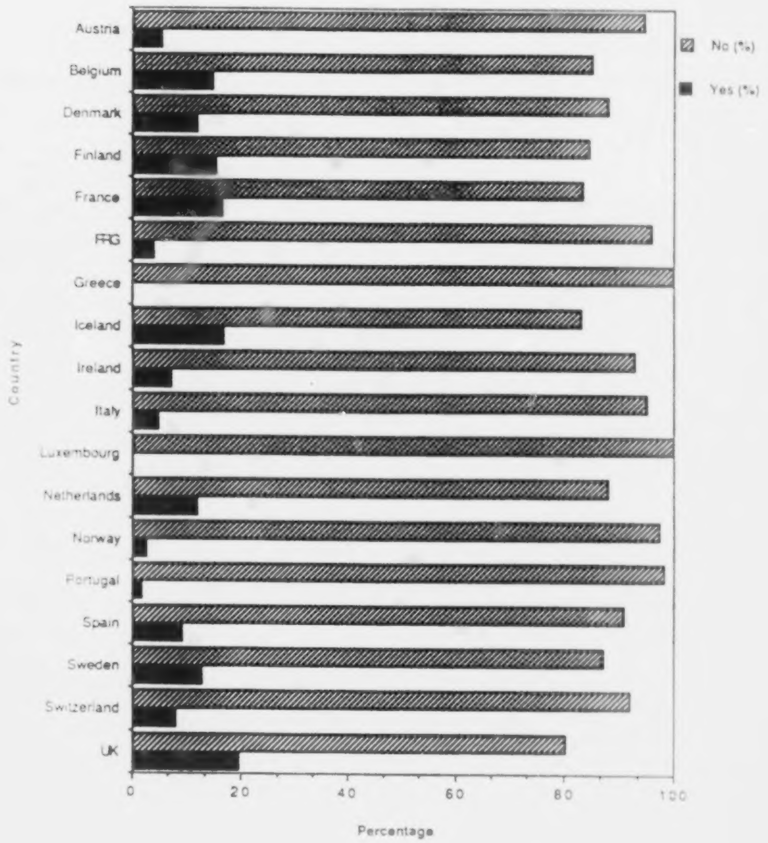
Table 1. Detailed Country Breakdown of Number of Questionnaires Mailed and Returned

COUNTRIES	Number of Questionnaires Mailed	Number of Returns Yes	Number of Returns No	Total Number of Returns
Austria	580	7	120	127
• Belgium	379	13	74	87
• Denmark	118	9	67	76
Finland	312	29	158	187
• France	1357	38	191	229
• FRG	3317	36	881	917
• Greece	70		6	6
Iceland	29	3	15	18
• Ireland	108	2	26	28
• Italy	1917	7	137	144
• Luxembourg	26		3	3
• Netherlands	1175	27	198	225
Norway	201	3	112	115
• Portugal	451	1	55	56
• Spain	1304	22	218	240
Sweden	370	26	177	203
Switzerland	626	12	140	152
• UK	1228	62	255	317
Total	13568	297	2833	3130 (23.1% of the total mailed)

• EEC Countries.

Fig 1

Optical Product Ownership in European Libraries



The 36 West German positive replies actually represent 12% of the total positive replies (297 from all countries - 9.5% of the total European return) and this is, in fact, the third highest total comparing to 13% for France and 21% for the United Kingdom which gave the highest positive returns. If just EEC countries are considered then the West German positive replies account for 16.5% of the total positive replies compared to 17.5% for French and 29% for UK libraries. By comparison Finnish libraries using optical products account for 41% of the total positive replies from the five Nordic countries.

The breakdown by type of library for the 36 West German libraries replying they were using CD-ROMs is academic libraries (19), special (8), government (5) and public (4). Regarding the 881 libraries replying that they were not yet using CD-ROMs, the figures are: special libraries (276), academic (261), public (172), government (171), other (1). Of the 36 libraries using CD-ROMs 4 were in Berlin, 3 were in Frankfurt and Hamburg and 2 were in Bonn and München. 22 other cities had 1 library using CD-ROMs (Essen reported none!). The highest number of negative replies came from libraries in Berlin (56), Bonn (50), München (48) and Hamburg (47). 33 libraries in Frankfurt responded as did 28 in Mainz and 21 in Stuttgart. A further fifteen cities had between 10 and 20 libraries responding to the questionnaire. By far the vast majority of cities had only one library which responded - although Essen had 4!

Over 60% of the libraries in West Germany replying that they had not yet installed CD-ROMs had under 50.000 volumes in their collection and 75% had less than ten staff - in many instances it was only one. And almost 40% had less than 1000 users. These figures actually compare quite well with the rest of Europe - over 50% of all libraries replying having under 50.000 volumes, 74% having less than ten staff and 50% having under 1000 users.

2.2 Acquisition of CD-ROM Products

While the actual range of CD-ROM products taken by West German libraries was from 1 to 35, 47% of those responding that they took CD-ROMs had only one product - this compares to 42 % for Europe as a whole. 86% took five CD-ROMs or less and only five of the 36 libraries had over six products - one of them the highest number of all (35 products). Most of the products had been bought or leased by the libraries responding, although a few indicated they were review or test sites.

The most popular CD-ROM taken by library and information centres in Europe as a whole was MEDLINE in all its versions which was taken by a quarter of all those responding. Books in Print was next, taken by 20%; while the BL/BN Pilot disc, BookBank, ERIC (all versions) and Ulrich Plus were taken by over 10%. In West Germany the picture was somewhat different - Verzeichnis lieferbarer Bücher was the most popular CD-ROM - taken by 17 libraries (47%) with the Deutsche Bibliothek CD-ROM second taken by 12 libraries (33%). Books in Print was used by 11 (33%) West German libraries and Ulrich Plus by 5 (14%). Perinorm was used in 3 libraries (8%) and most of the remaining products were used in only one library.

Asked if they would be willing to pay for other optical products, a good proportion of libraries in West Germany said that, based on their experience with the products they had already bought, they would be prepared to buy new products - particularly if they were in the German language. Reasons for buying (given that money was available) included that products provided better access to information and were more efficient to search. Several said they just had to have certain products and unlike other European libraries very few West German libraries said they would only buy them if they became cheaper. Only a small number of libraries specifically stated they would not buy optical products based on their experience - the main reason being that of cost.

2.3 Impact of Optical Products

A fair number of West German libraries (11%) indicated they had not had optical products long enough to be able to ascertain their impact on users. Where this information was available, there had been a generally favourable and positive impact. Specific observations were that CD-ROMs enabled greater information access (noted by 19%) and saved the users' time. Furthermore end-user searching was considered possible by 14%. A reasonably high number noted they would cancel subscriptions to printed abstract journals to save money or space or because they did not need both print and optical versions. On the other hand many other libraries felt they needed paper access and had to keep print versions for the public.

Virtually no respondents had actually integrated optical products into their in-house operations and very few libraries and information centres were considering implementing an optical publishing project of their own at the present time. It was generally felt that CD-ROMs offered the highest potential for fast, end-user retrieval of bibliographic references and/or full-text documents in the form of encyclopaedias and directories.

Several of the respondents who replied they did use CD-ROMs noted that their usage of online databases was reduced. The main reason given for reduced online use was that CD-ROMs were cheaper and were always available for searching and in fact could be searched without any accompanying telecommunication difficulties. This meant that end-users could do searches themselves without the necessity of an intermediary.

Out of a total of 493 CD-ROM players in European libraries, 46 (9%) were used in libraries in West Germany. Although one West German library possessed 16, the majority of libraries (63%) in the country had only one drive. Hitachi drives - in 69% of the libraries replying - seemed to be the most popular CD-ROM player in West Germany and indeed in Europe as a whole where they were installed in 55% of libraries. Philips drives were used in 22% of libraries in West Germany, while Sony was used in 6% and Toshiba in 3%. More often than not the CD-ROMs were used by library staff rather than end-users.

2.4 Pros and Cons of CD-ROM Products

On the whole users found many CD-ROMs easier, faster, more flexible and more convenient to use than corresponding print and online products. Many CD-ROMs were considered better than print products and were often more comprehensive in coverage. They also offered more powerful search capabilities and interaction and end-users could search them without the necessity of an intermediary. Since there were no telecommunication links - and thus no line failures and breakdowns - and because there was no apparent cost to search (ie no per minute or hit charge) there was less time/cost pressure and stress on the searcher.

On the other hand, some users found certain CD-ROM software somewhat inflexible and difficult to use and they preferred the flexibility and layouts of online databases. A number of libraries complained that CD-ROMs could only be used by one person at a time and were slower to search than online databases - certainly for quick reference or browsing or single look-ups. Other criticisms were the limited amount of data, missing relevant sources and the short time-span covered by some CD-ROMs as well as the fact that they were not updated frequently enough.

Some seventeen different features and facilities were listed by West German respondents as being desirable for CD-ROMs. Among the most requested were a standardized search language; cheaper products with a better price structure (ie no leasing); and better printing capabilities. Other features requested by libraries in other European countries included faster response time; quicker updating; networking, remote and multi-user access; more user-friendliness and better help facilities and menus. More coverage of all types of material (eg books, encyclopaedias, directories etc) was also required - as was better coverage of chemistry, business and law.

2.5 Libraries Intending to Acquire CD-ROMs

881 libraries in West Germany said they were not currently using optical products. Asked if they were thinking of acquiring them, 303 (34%) replied that they would probably acquire them in a year or two, while 557 (63%) said they would not acquire them and 1% said they might.

Many libraries did not reply to the questions asking why they would or would not install CD-ROMs and what factors were likely to influence their decision. For those that did reply reasons for wanting to acquire CD-ROMs included that the library would be able to offer better services to users (6% said this - compared to 12% for Portugal and 16% for the UK) as well as provide faster access to more information (mentioned by 5%). Another 5% believed they would offer the potential for more efficient searches compared to 14% in Denmark and Sweden and 13% in the UK. Another 5% thought that it was time to get them because they were popular now and considered hi-tech - this compares to 11% for Sweden. Only 2% wanted to get CD-ROMs because they provided ease of use.

Regarding factors which would influence the decision whether to acquire optical products or not, 28% of West German libraries said it depended on the cost of products and/or on whether they were able to get the necessary budget to pay for them. This is slightly higher than the response from the total European return which was 22% - but much less than the UK and Denmark where 57% and 56% of libraries said it depended on the cost and/or the budget. 15% said their decision rested on the type and variety of product that became available on CD-ROM and their ease of use and time-saving (compared to 19% in the total return). A fair number mentioned they were dependant on decisions from higher authorities and quite a few, particularly universities, were involved in amalgamation or network plans.

As for products required, it was quite obvious that many more products of a German character were desired. This was, in fact, the same for most other European countries, ie countries wanted optical products in their own native languages and relating to material of a local or national nature. The most requested products by those relatively few West German libraries replying were Verzeichnis lieferbarer Bücher (VLB) and the Deutsche Bibliothek CD-ROM followed by Books in Print and MEDLINE.

2.6 Libraries not Intending to Acquire CD-ROMs

Those not intending to acquire optical products stated it was because they were just too expensive or they had no budget or funds available or that they could not justify the cost (17%). A relatively small number of respondents (9%) indicated they simply had no need for such products or that there was inadequate demand for them - this compares to 25% of Danish libraries and 20% of British libraries. Others considered there were insufficient suitable products available to meet their users' needs. While only 2% of Danish libraries considered they were too small, some 13% of West German libraries replied that their libraries were too small or specialized or lacked suitable staff and sufficient space. A number of librarians noted their libraries were not yet automated and thus they had higher priorities such as the purchase of a microcomputer.

3. Conclusion

This paper has provided a brief summary of the results of a survey into the use of optical products (primarily CD-ROMs) in all types of library and information centres in West Germany. The survey revealed that, as of autumn 1989, relatively few libraries in West Germany as well as in the rest of Europe are currently using CD-ROMs. West Germany, however, ranks as one of the lowest users. Where they are being used, in many cases they have been acquired only very recently and thus libraries have not yet had much opportunity to evaluate either their impact or their advantages and disadvantages. It is clear that, at present, CD-ROMs are being used mainly in the larger academic libraries which have large book stocks, large staffs and a large user community. They are also being used mainly by library staff for library purposes such as bibliographic verification, orders and acquisitions, cataloguing and indexing.

The survey also showed up a relatively surprising lack of knowledge and awareness about the availability, applications and use of CD-ROMs and optical products in general. Some librarians said they did not have any knowledge at all of CD-ROMs, while several public libraries in West Germany considered microfiche to be an optical product and thus within the scope of the survey. It is hoped to carry out a further study in a year or so and it will be interesting to compare the picture then with now.

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Purposes of Interactive Optical Discs for Libraries and their Users

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Purposes of Interactive Optical Discs for Libraries and their Users

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Abstract

The Belser interactive optical storage system makes it possible for one to work with an enormous quantity of text information and colored images in good reproduction quality. The system is a result of a project together with Christa Schwens, University of Essen.

The hardware-equipment needed is either an IBM-compatible personal computer (AT) with an interface, or a MAC, video-disc-player and a color monitor for the images. Several resolution-qualities are available, for example a VCA-Monitor.

The software, easy to handle and user-friendly, links up text and image databases.

This system offers an image retrieval-system with a short access time and the user is able to do research
- either in the text database, coming up on floppy
- or in the image database, available on a video-disc
- or in both, in several different levels of research-quality and even in combination of the questions (interactive).

In addition to these research possibilities there are the following options:
- print outs of the text (including own comments)
- storage of own comments to the existing texts and image databases on a personal floppy
- storage of a personal selection of images (for example, by "Cranach").

At the moment five interactive video-discs are available:
- "Dutch Barock Painting"
- "Painting of the 19th Century"
- "German Painters of the Renaissance"
- "Gothic Painting" and an interactive optical disc
- "New Testament" from the 13th Century.

Each of these have thousands of images and the corresponding scholarly text databases, that enable interactive research.

Last - but not least - it is possible to create any kind of linked color image and text databases.

Microcomputer Applications in Manuscript and Rare Book Collections

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Microcomputer Applications in Manuscript and Rare Book Collections

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Abstract

0. Mainframe has been used for our main catalog since the sixties, and, whereas experiences with this general off-line catalog are sufficient, for special purposes it failed. The catalog of the Humanist Goldast Collection (16th/17th century) has not been finished because of technical shortcomings and unfavorable criticism. Thus, in the mid-80ies, we had to try cataloguing on recently developed IBM compatible Personal Computers. Major requirements to software to be handled by librarians should be: ready made user shell, in order to avoid dependence from outside support, as well as options for data exchange with related national and international institutions.

1. The first project completed on PC was the shelf list of Welding collection, covering books from 17th to 20th centuries in several languages. We used WordPerfect word processing program, because it provides the following functions: sorting, spelling, and automatic hyphenation for different languages within the same file, automatic index generating, symbol set of 512 characters, newspaper columns, parallel columns. WordPerfect Version 5.0 has been essentially improved regarding printer drivers, proportional script and justification. We chose WP instead of MS Word, because WP allows longer files (important for index generation). However, originally we had to convert WP 4.2 files into MS Word for printing, because of higher feasibility, as far as proportional script and justification were involved. We did not use dBASE, mainly because it was aimed to print out the catalog as a book, and

that program is not feasible to make a good layout, without converting dbf-files into text-files. In this case, I had to learn dBASE as well as word processing for the same project.

2. The main shortcoming of dBASE and dataPerfect consists in field length: it has to be defined with regard to the longest possible entry. In order to avoid this difficulty, I used Memo-fields for the second project, still running. It is a research report on linguistics. Bibliographical data are entered into dbf-files, whereas summaries are edited in dbt-(Memo)fields. To print them out, they can be put together by means of short program (see enclosure). Whereas in word processing footnotes or endnotes usually are not displayed on screen, here we have the reverse: the text of the future book is hidden in Memo-fields, and bibliographical data only are displayed.

3. In cooperation with Hill Monastic Manuscript Library (HMML, Minnesota) we will microfilm and catalog about 100 medieval manuscripts more or less according to the system elaborated by HMML. It consists mainly in four dbf-files, and the problem of field length has been solved by creating an additional runover file. To print them out they will be put together by a rather complicated home made report program, and thereafter converted to MS Word 4.0. This, again, seems to be necessary, because dBASE III + does not provide facilities for special character sets and printing devices. Since the Alcobaca catalog (1988) has shown convincing results, we will proceed in close cooperation with HMML to try the same for a limited number of Bremen holdings. That means we will copy the whole US-made system including the report program, in order to attain international standardization in the field of describing medieval MSS.

4. The problem of field length in relational database has been solved by Allegro and LiDoS in a way different from dBASE and dataPerfect. In those W. German programs unintended and unnecessary blanks are not saved as part of dbf-files. Therefore they occupy less memory on hard disk than the worldwide known database programs. Moreover, they show higher flexibility regarding special symbol sets, and the upgraded version LiDoS Multilingual provides even facilities for controlling Greek and Cyrillic entries. The last criterion determines our choice for LiDoS MuLi in the near future for cataloguing modern MSS. and papers (Nachlässe).

Microcomputer Applications in Manuscript and Rare Book Collections

0. In the first part of my contribution I will deal with personal experience, and in the second part with projects. My main topic is the choice between (1) word processing and database programs, and (2) between different ready made software packages, depending on special requirements. It is not aimed to recommend particular programs, but to show the limitations of word processing in cataloguing. As far as I now, those cataloguers who use personal computers in their work, are not familiar with the possibilities of database programs. Therefore, I plead for a standard format, in order to prevent later trouble. In West Germany, we are now at the very beginning of cataloguing manuscripts and rare books by means of microcomputers, and all should be done to unify procedures. At this stage, it seems still possible, since only 200 people at best are involved in that special field.

I started in autumn 1987 on a Victor PC IIe with 20 Mb hard disk. From January 1989 on, we are now better equipped with software, including *Windows* and *Ventura*, for special purposes. In the State and University Library Bremen, mainframe has been used for our main catalog since the sixties. In the first instance, printouts on paper were distributed as paper copies; later we used microfiche which is easier to copy. Mainly, there is an alphabetical catalog as well as a systematic catalog; there exist also a subject heading index and a so-called 'regional catalog'. We have the possibility of editing special catalogs according to specific items; e. g., imprint catalogs. Until 1965 cataloguing was processed on international format card files. For special questions the old catalog is still indispensable due to peculiarities which prove it to be more efficient than our new COM catalog. Searches for persons or places are possible in the old files, but in the COM catalog no such facility is provided.

There are three reasons unfavorable to the application of mainframe for purposes of cataloguing manuscripts or rare books. First, dependency on the mainframe proved inconvenient, because our library shares that mainframe with other institutions. Second, the program used is guided by necessities of West German RAK (Rules for Alphabetic Cataloguing). Categories not needed by RAK are placed in a data field which cannot be searched. As an alternative, a wholly new program oriented on the requirements for cataloguing MSS and rare books would have to be written. Third, mainframe had been used some ten years ago for cataloguing the Goldast Collection. Its books date back to the 16th and 17th centuries, and RAK does not fit for such items. The catalog of the Goldast Collection was not completed due to technical shortcomings as well as bad criticism. Thus, in the mid-eighties, we had to look for a third way between typewriter plus card files, on the one hand, and mainframe on the other.

1. Features of Word Processing

1.0 About 1985, IBM compatible personal computers were sufficiently developed for writing book manuscripts, as far as speed and storage capacity were concerned. Microcomputers combine functions of the typewriter with those of traditional card files. Automatic sorting, footnote control, indexes, newspaper columns, proportional fonts and line justification are the main features of good word processing programs. However, going into detail, the advanced user may become aware of some shortcomings. You have to correct the results by hand, or the message "not found" appears on screen, because some PC software packages, at least in certain routines, follow in sorting or searching the US ASCII symbol set.

Before reaching an agreement about regulations for PC application in our library, we had a single one, mainly used for editing data supplied by external databases. It worked with *dBASE III plus* and *MS Word 3* at that time. Of course, we made our first experiences concerning application of personal computers in processing manuscripts and rare books with those software programs. After some tests, which came off disadvantageous, we decided against the above mentioned software programs for application in the first concrete bibliographic project. We preferred *WordPerfect 4.2* for two reasons: (1) WP is able to process larger files (important for index generating), and (2) sorting capacity was better than in Word 3. We did not work with dBASE, because that program does not allow good layouts for printing. Since it was clear from the very beginning that the bibliography should be submitted to DFG (German Research Association) and, later on, to a publisher for offset printing, we had to print out by means of a word processing software. For a beginner, it would be too hard to learn two programs in the same year. Secondly, a database file written in *dBASE III plus* would consist mostly in blanks, since for the Welding catalog very differing length of catalog entries is characteristic. The large amount of blanks would lead to undesirable consequences for screen as well as for hard disk capacity.

We used WordPerfect word processing program, because it provides the following functions: sorting, spelling and automatic hyphenation for different languages within the same file [1] automatic index generating, symbol set of 512 characters, newspaper columns, and parallel columns. *WordPerfect Version 5.0* has been essentially improved regarding printer drivers, proportional typestyle and line justification. However, first we had to convert *WP 4.2* files into *MS Word* for printing, because of its higher capacity, as far as proportional spacing and justification were involved.

1.1 Welding Collection Catalog

The first project completed on PC was a bibliography of a special collection (Katalog Welding), covering books from the 17th to the 20th centuries in several languages. The Welding Collection contains books and archive materials about Livland and the Baltic Germans; it was sold to our library in 1963 by the heirs of the former judge Olaf Welding, who collected all his life materials about his native country. Since he studied law in Imperial Russia, 212 titles of his collection are in Russian. Most of the rest is in German, but out of the 1,740 titles of his collection, a large number are printed in several other European languages: Estonian, Swedish, French, or Latin. 23 entries of the catalog pertain to manuscripts or archive materials, and they should not be catalogued the same way as printed books. Moreover, 511 books were published before 1900, so that catalog entries should be somewhat larger than for modern ones. This shows, that cataloguing the Welding Collection is not quite the same thing as cataloguing usual printed books, and RAK rules should not be followed strictly.

In 1963, the Welding Collection was catalogued according to the so-called Prussian Instructions (Preussische Instruktionen), and now, while transferring it to the COM-catalog, we had to follow the RAK rules. That means, that old data could be copied only to a certain extent. Inquiries were necessary mainly as far as corporations were concerned. This job was done by a librarian, paid by DFG, whereas permanent staff picked out titles not to be entered into COM-catalog and prepared RAK-data for the intended book catalog. Pamphlets of less than 32 pages ought not enter our general catalog, and for the future printed catalog additional data concerning format in centimeters, binding, owners' marks, dedications etc. had to be collected. In the book catalog, length of entries varies between 2 and more than 20 lines. The printed catalog contains indexes, providing search facilities beyond the possibilities of our offline catalog.

1.2 Trouble with Indexes and Character Sets

1.2.1 Literary bequests are closed units, there will be no additional entries. This is an important condition for using word processing in cataloguing. Indexes may be generated automatically, and there is no need to write report programs transferring database files into text files. However, in using WordPerfect 4.2 we had some difficulties, only partially eliminated in Version 5.0. The most important trouble arose from the fact that indexes refer to page numbers instead of call numbers. When changing or adding remarks, the making up has to be altered, too, and the index numbers are to be superseded by new ones. This would do no harm if index generating were totally automatic. However, as already mentioned, usually one must correct indexes by hand. Therefore, it would be more convenient, if indexes referred to call numbers. Then they could remain unchanged.

For that task a special program in Turbo-Pascal had to be written. Without help from experts this problem would have been left unsolved. Users of personal computers usually are not computer freaks, but mere users, interested in doing their job in a more comfortable or efficient way.

1.2.2 A second unsolvable problem was the transcription of Russian titles. RAK prescribes the rules adopted by Slavists, which consist in using the Czech character set for Romanizing Russian. On German typewriters one or two keys have to be altered for writing that way, whereas the extended ASCII character set does not take languages of COMECON countries into consideration. Linguists as well as librarians constantly wrestle with such restrictions of modern technology. WordPerfect was the first software program providing features for writing not only Latin alphabets including diacritical marks, but Greek and Cyrillic, too. Yet the problem is not solved this way, since printers are not able to print what you see on screen. The **new standard of 512 characters** is not yet taken into consideration by manufacturers of printers, and the Roman8 character set includes only one of the most needed three characters: Sa.

Remedy is provided by additional softfonts, but it depends on price and graphic card, whether you see the symbol set on screen or not. Usually there are restrictions in type style and/or type size. Since we had formatted some indexes of the Welding catalog in Word 4.0, we needed additional softfonts for both programs, *WP 5.0* as well as *Word 4.0*. Handling is somewhat uncomfortable, and italics are excluded, but on the whole we can say, that one year after termination of that catalog the development of software packages made possible the solution of several problems, which in 1988 looked unsolvable.

There are several programs especially conceived to meet the needs of linguists and technicians *(Wi-Tex, Multilingual Scholar, T*[3] etc.). They are complete word processing programs, not only typesetting or utility programs, and therefore they must be evaluated according to standards established by world-wide accepted programs. From this point of view they are not recommendable, except the feasibility of printing special character sets or even non-Latin alphabets.

1.3 Searching in Text Files

Another trial of application word processing for cataloguing did not lead to convincing results. Before WP 5.0 (German version) was released, we used Word 4.0 for writing a short title catalog of Bremen held incunabula (180 titles in all). Every title makes a file, and searching is possible through File-Manager (Esc, Betriebssystem, Datei-Manager - in German version). This utility is conceived for searching correspondence, and it turns out to be efficient, if one types author, item, addresses etc. to every dispatched letter. However, fields cannot be renamed, their length is extremely limited, and in search routines only four fields are displayed, whereas for input you may use six fields. Wild cards (* or ?) are accepted, and truncating entries is possible (**M******er** for *Maier, Meier, Mayer, Meyer)*, but only one entry is displayed, if several ones would be possible (only one Meier or Maier, not all of them). Therefore, this newly developed utility of Word 4.0 fits better for **browsing** than for searching.

WordPerfect 5.0 provides a utility similar to the just described menu in MS Word 4.0, but it is more efficient, and part of it was already resident in WP 4.2. Pressing F5 (File control - *Dateiverwaltung*), Option 9 (Search - *Wort suchen*) one may search (1) in four fields stored as annotation to the text file, (2) in the first page of the file, (3) in the whole file **(full text).** The last mentioned option was already found in WP 4.2, but there were restrictions as to character set. In WP 5.0 this seems to be corrected, so that the full 256 character set is open to searching, however the new standard of 512 characters is not always accepted by the menu. If you enter a Russian name in transcription containing one of the special characters, the message "no hit/not found" may appear on screen. - It is frustrating, that while looking for Hu the cursor stops at hunter, husband etc. In other words, a name like *Hu* is interpreted as fragment (the same holds true for chemical formulas like *Cu, Fe* etc.), and the program reacts as if *Hu** (with *wild card*) was entered.

One can search in text files of other programs (e. g. Word 4.0) by the above mentioned WP 5.0 utility, but in order to use the information efficiently, one needs Windows. Otherwise one cannot load both programs for working alternatively in them.

If one wants to search in full text, one should use databases because of the restrictions observed in word processing programs. That is why we plan to transfer the Incunabula file into a database file (in dBASE: *append from x.txt delimited)*. Quite intentionally only short titles were entered. In Word they could be extended without problems, but in database files definite field length prevails, so that we had to experiment with the largest field size provided by *dBASE III plus*.

2. Memo Fields Used as Draft for Book Manuscripts

2.1 Layout for the Welding catalog has been completed now, and we hope it will be printed in the offset process, so that it can appear in the spring of 1990. It depended on specific conditions that this work could be achieved totally in word processing programs. If it takes several years to complete a cataloguing project, it is better to start with cataloguing in a database. One can print out reports, but usually it is sufficient to use the database for reference. In this case, the screen should be set up in an appropriate way. Final layout can be made as the last step in a word processing program.

One feature of databases is the possibility of updating entries and adding new entries without problems of sorting. On the other hand, you always have access to the data, but duplicate control is not always granted. One major shortcoming of dBASE has been mentioned: fixed field length. The same holds true for the database of WordPerfect - *dataPerfect*. Since in our library only *dBASE III plus* was at hand, our first experiences regarding databases were made with that program. For training purposes, a project was conceived, which should lead to a final printout as a book. But completion is scheduled for several years, so that it seems appropriate to use database technology.

2.2 Our objective is writing a linguistic research report by collecting bibliographic data, and thereafter writing abstracts or summaries to the titles already read in. Titles are entered into a dBASE structure, and the summariès are hidden in memo fields. When needed, they can be made visible, but during usual routines they disappear from screen. At a later stage, the whole file will be sorted according to keywords or subject headings, and thereafter processed as text file in Word 4.0. There, the bibliographic data will be transformed into footnotes or endnotes, and thus, again, disappear from screen. The summaries will be put together to form a running text. This procedure seems to be efficient in order to avoid typing several times the same texts or data.

It was necessary to write two different programs (1) for printing memo fields and (2) for deleting superfluous blanks still preserved in Word 4.0. Perhaps this procedure is no optimum application of dBASE, but the lecture list of Bremen University (summer 1988) was made more or less the same way (printed in *TEX* instead of *MS Word)*. - I would recommend users of dBASE to load *MS Word* as soon as possible, since the capacity of dBASE text editor is very limited, and Word can be loaded into active memory *(Arbeitsspeicher)* without leaving dBASE. With MS Word one can write programs or process text files generated in dBASE. The same is not possible with *WordPerfect 5.0*, since that program is too large.

Field 19 "Finished" was defined as a logical field *(True/False)* in order to distinguish records with empty memo fields from those, where memo fields are already filled in. However, I was told that logical fields in dBASE provide only limited possibilities of searching and selecting, whereas the same objective can be reached by a character field *'Yes/No'*(Y/N). I leave this question as an open problem, since I am not able to present my own experiences thus far. In any event, memo fields as well as logical fields demand skill and experience, and should be used only by advanced operators.

Basically, this project has nothing to do with the task of manuscript cataloguers, but it was conceived for training. The further work will be done in Berlin. In Bremen, we had to test the functions of different field types regarding a concrete bibliographic project. The procedure of writing a treatise out of the data stored in memo fields can be transferred to other items, it is not limited to linguistics.

It is common sense, that primary input for bibliographic purposes should be done in a database. Under certain conditions one can reach the same objective by using word processing, but it is less comfortable and should be avoided, if cataloguers are skilled enough to use a database program. Because of the complexity of *dBASE III plus* it is necessary to write programs not provided by the manufacturer Ashton Tate, or to find a collaborator who is able to do it, if the cataloguer himself is not. Otherwise, a user interested in prompt results and easy handling falls back to word processing programs, which are easier, but relatively primitive.

3 International Cooperation

3.0 At the Librarians Convention 1986 Dr. Dachs, head of Manuscript Dept. in the Bavarian State Library, announced that in Munich a pilot project on microcomputer application for cataloguing medieval manuscripts would be carried out. The objective was to create a special program according to DFG requirements. One year later, at the convention of DFG manuscript cataloguers in Eichstätt, PC application was a special topic. However, I heard that the Bavarian State Library desisted from the above mentioned project, because there was enough useful software on market. Going into details, the only PC software mentioned at the meeting was WordPerfect. Obviously, the organizers of the convention thought it would be best to write in word processing, and thereafter to print by means of composing programs like *TEX* or *TUSTEP*. Merits and shortcomings of WordPerfect (and *Word 4.0*) have been pointed out in my contribution, but I cannot content with it. Trouble with index generating was one of the problems left open at the Eichstätt convention.

3.1 Aside from trouble with one program or another, it is not at all efficient to catalog manuscripts in word processing programs. Did the Bavarian colleagues or the DFG not realize this problem? If the Bavarian State Library had carried out its project, this would be a great help for manuscript cataloguers. I am thinking of a standardized format (structure) according to DFG rules for cataloguing medieval and modern manuscripts as well as bequests *(Nachlässe)* including report programs depending on program requirements. As it is now, everyone tries and tinkers of his own, and the results are scarcely communicated to librarians or DFG collaborators.

Information about computer software presented at conventions of librarians or documentalists is oriented to a large number of purchasers, and the possibilities of implementing those programs or problem solutions in cataloguing manuscripts, bequests and rare books prove restricted.

3.2 Since national cooperation was of little use, Bremen State and University Library accepted the proposal of data exchange with an American institution. Dr. Amos, librarian at *Hill Monastic Manuscript Library* **(HMML)** in Collegeville, Minnesota, was invited to report on his work at the XVIIIth International Congress on the History of Science. The congress was organized by Prof. Folkerts, German Museum in Munich. HMML published last year a printed catalog [2], covering 150 MSS. Since HMML is microfilming medieval manuscripts (including 16th century) all over Europe, it is quite natural that people are interested in technical aspects of that project. The manuscripts are described in Minnesota, but not all can be catalogued as meticulously as the Fundo Alcobaça of Lisbon National Library.

I cannot describe in detail the computerassisted cataloguing project of Hill Monastic Manuscript Library. I want to point out how HMML mastered the difficulty of limited field length in dBASE III plus without using memo fields. Basically, HMML uses four *dbf* files and a runover file. According to special tags, entries from codicology and contents files exceeding field length are transferred to the runover file. Only character, number and date fields are used, no logical or memo fields. Printout is controlled by a report program of about 3,5 pages, on XT it takes three and a half hours.

Dr. Amos did not write the report program himself, but it was written by a student of computer science under Mr. Amos' guidance. This corresponds to the situation in European libraries, and we are glad to see that American librarians are no supermen either. It is quite reasonable to adopt a program already tested in practice.

Advantages are obvious: (1) one does not need time for developing one's own programs, and (2) a long time before termination of the whole database, data can be exchanged on floppy disk, since dBASE is known world-wide. In 1991, when a team comes from Minnesota to microfilm our manuscripts, we can read-in data which can be collected on the spot without painstaking investigations. This holds true for codicological data and incipits, which can be entered into the given structure.

4. Documentation in Foreign Languages

4.1 dBASE is a powerful relational database with a large field of applications, all the more if combined with the spreadsheet program *Lotus*. But even the menu-driven version III plus is not so easy to use as to meet the modest requirements of librarians or documentalists. Moreover, the large amount of stored blanks slows searching routines. Therefore, if we do not think in terms of international data exchange, we warn against the use of dBASE for writing bibliographies or collection catalogs.

On the West German market, three domestic programs prevail: *LARS*, *Allegro* and *LiDoS*. All of them have their merits and shortcomings, and we describe here only the recently released *LiDoS Multi Lingual (MuLi)*, because it seems to be most interesting from the point of view of printing out. The net price is about 3.250 DM for universities. *LiDoS 3.2* is available in a network version, but this does not come into question, because only libraries with large manuscript collections need more than one cataloguer. Therefore, if I say indistinctly *LIDOS*, I mean *LiDoS MuLi* with enlarged character sets, but not the network version.

4.2 This program aims exclusively at bibliographic databases, and is fully menu-driven. Writing special report programs is not necessary, and the problem of fixed field length does not occur. Per record one may enter a number of characters corresponding more or less to 25 pages, but only the actual number of characters is stored, no additional blanks. For selecting records, one can enter up to three criteria; e.g., author, place and year. For old books it may be of special interest to select entries by imprint. The program can select those data for searching routines or printout. There are three features favorable to application in manuscript and rare book departments: (1) input, storage, and searching can be made not only in the extended ASCII character set, but in Greek, Cyrillic and scholarly transcription as well; (2) keyword indexes referring to record numbers can be printed out. Numbers are given automatically, so that mistakes can be better avoided than in manual input [3]. (3) Sorting order can be fixed by user. Otherwise, the program follows default.

For editing foreign alphabets, the screen is switched to graphics, so that one sees entries in correct spelling. For printout necessary softfonts belong to the package, but at this moment, only 24-pin matrix printers and *Hewlett Packard LaserJet* can be driven. *InkJet* does not yet belong to the range of operable devices. The "German" version *LiDoS 3.2* serves a larger scale of printers. The possibility of editing Greek in original spelling as well as Slavonic and Oriental languages in transcriptions demanded by RAK and scholarly use eliminates a difficulty bothering many bibliographers. However, it has to be proven if all European languages can be processed without restrictions. Polish, e. g., always makes trouble.

Since we never use special catalogs in Cyrillic letters, shelf lists show mixed entries, and titles or indexes have to be sorted as if there were no diacritical marks. This procedure is supported by LiDoS, but other options are left open. Bibliographies of titles in one only language may be sorted according to rules adopted in the country concerned. In Czech, e.g., *Ch* is not sorted under *C*, but as a special entry after *H*. Finally, by means of a font-editor the program allows creating new character sets if the users' demands are not met by the package. Thus, it is flexible enough to meet all requirements of linguists concerning character sets in databases.

If in 1987 LIDOS were at our disposal, we could have read-in the whole catalog of the Welding Collection in LIDOS and formatted for printing out. Yet, without final transfer to a word processing program we could not print out the same way as we did now, because newspaper columns and automatic word wrapping are not possible. The manufacturer is negotiating with WordPerfect to reach an agreement concerning transfer utilities from LiDoS to that word processing program. At this moment, transfer is possible through ASCII conversion.

5. Conclusion

Daily work in manuscript and rare book departments does not mean managing large databases, but extensive description of a small number of titles. Databases usually are not totally printed out, since this contradicts the sense of such programs. Even selected data records are not formatted for a book catalog, but are mere supplies for scholars in their research work. Therefore, we can summarize what kind of requirements meet the above mentioned two types of software, and which are their shortcomings. According to such limitations one may choose the kind of software able to fulfill a concrete task.

If cataloguing entries are ready and sorted, and the collection will not be enlarged, one can copy card files and generate automatic indexes. Since word processing programs usually process only files of limited length, one has to partition the manuscript into several files. *WordPerfect 4.2* was able to generate indexes out of a temporary file covering more than 640 KB (active memory). It has to be tested, whether the same still holds true for WP 5.0; in any event, the manufacturer dissuades from such an application. If indexes must refer to call numbers, shelf marks, running numbers etc., no available word processing program provides utilities for automatic generating.

Sorting depends on: (1) position of term to be recognized by the computer (sorting paragraphs or columns), and (2) the number of partition-files. Sorting is possible only in one file! - Searching is troublesome if several files are involved. In some cases, the US-ASCII character set is followed, so that one gets "Not found" messages. Maybe the program finds *Hut*, but not *Hüte*, *Négligé*, and *Façade*. TS function *(Text Search)* in *Norton Utilities* may be a last resort, but selecting of data found is not possible.

For databases there are no restrictions of length other than those of DOS (32 MB). Sorting, searching, and selecting work insofar as the record structure and descriptors support the procedure. Using databases for writing a book is a kind of abuse, since this means total printout. For standard users of databases this is no reasonable application. dBASE, Allegro and LARS cannot generate indexes for printout, they are used for searching and selecting only. LiDoS supports automatic generation of indexes referring to call numbers or record numbers. For printout, there are some restrictions, as far as newspaper columns and word wrapping are involved.

Therefore, we may say that even with most developed and most specialized database programs it is not possible to process book catalogs or bibliographies from the collecting of data to the layout for offset printing. At least at the very last stage, application of word processing programs will be necessary. A librarian who is not able to master two different programs or who has no colleagues to help, should use word processing programs from the very beginning. This means, however, less ease in sorting, searching and selecting.

I would like to direct the following recommendation to the DFG subcommittee for manuscript cataloguing: based upon *LIDOS MuLi* an additional program should be developed, which, according to the Rules for Manuscript Cataloguing [4], covers (1) the record structure, (2) a thesaurus for descriptors and indexes (form of proper name entries, *loc. cit.*, p. 15 - 25), (3) the hierarchic structure of indexes and (4) a printout format with regard to offset processing.

Perhaps, the same objective could be reached by a CD-ROM disk containing all reference data for a dictionary index in hierarchic form. In this case, the disk would be independent from the database program used, which is of major concern due to quick development and updating of application programs.

Since PC application provides facilities for printing out perfect offset layouts, one should avoid the additional costs caused by processing in a printer's office. Otherwise, one depends on solicitation of contributions from sponsors. Thus, PC application means more independence and less division of labor.

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[1] E.g., this text has been written under *WP 5.0* with automatic hyphenation in American English. After converting the file to MS Word for outprint on LaserJet, hyphenation had to be done by hand, since the German version of *Word* provides speller, but no foreign language hyphenation utility.

[2] Amos, Thomas L.: The *Fundo Alcobaça* of the Biblioteca National, Lisbon. Vol. I: MSS 1 - 150. Collegeville, Minnesota: HMML 1988, 49, 307 S. - They worked on an XT with *dBase III plus*, printout was made with *Microsoft Word 4.0*.

[3] *In dBase* one can generate indexes too, but special fields must be defined. In HMML Alcobaça catalog file, there are eight KWIC fields, and the printed catalog contains a general index of 18 pages. It refers to a current number (1 - 150) given by HMML. The original shelf marks were Roman ciphers.

[4] Richtlinien Handschriftenkatalogisierung. 4., erw. Aufl. DFG. Unterausschuß für Handschriftenkatalogisierung, 1985, 75 S.

The Use of Hypertext for Orientation: the NCLIS Approach

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Abstract

The use of microcomputers in libraries is no longer at all startling; in fact, the existence of micros has given small libraries the opportunity to become involved in automation, when it was impossible for them to afford large-scale computing.

NCLIS has for years used microcomputer systems for word processing, database management, and spreadsheet calculations. However, the recent introduction by the Apple Corporation of its "Apple Library of Tomorrow" (ALOT) program has enabled NCLIS to acquire a full-scale Macintosh configuration, in order to test the effectiveness of Hypertext on teaching people about libraries.

NCLIS is responsible for organizing a nationwide White House Conference on Library and Information Services, which will take place in 1991. This conference will be preceded by many state conferences, and will bring together information professionals, friends of libraries, elected officials, and lay people. Clearly, in order to talk successfully about the issues of library and information services, the conference attendees should have a common denominator of understanding of these issues. NCLIS is using Hypertext to build stacks that will teach about selected topics at the basic, intermediate, and advanced levels.

The Hypertext stacks will be available at the conference itself; more importantly, it will be available in every state or region to allow people to learn about current topics such as library

financing, information policies, the "free or fee" question, or preservation of library materials.

A pilot version of the Hypertext stacks was exhibited at the recent ALA conference in Dallas. NCLIS asked librarians for comments, suggestions, and assistance. The NCLIS staff will work with library schools and consultants during the coming months to fully script the software and to send it out throughout the country, wherever states are holding pre-White House conference meetings.

The Use of Hypertext for Orientation: the NCLIS Approach

I. NCLIS

Description of Project in Process

In order to explain our rather unusual microcomputer application, it will be useful for the audience to know something about NCLIS as an organization, and also some facts about the environment that NCLIS is now in - that is, beginning preparation for the second White House Conference on Library and Information Services.

The National Commission on Libraries and Information Science is a permanent independent agency of the federal government of the U.S. For administrative purposes it reports to the Executive branch, but its charge as expressed in the brief law which brought it into being twenty years ago is, among other things, to advise both the White House and Congress on matters relating to library and information science in the United States. Other elements of its mandate include: working with agencies within and outside the federal government to stimulate and improve library and information services; acting as a catalyst for significant change in information support; assessing the nation's need for library and information services; and conducting studies to support these assessments.

The National Commission on Libraries and Information Science is the third smallest agency of the United States government. It has nine full-time staff members, and fifteen part-time commissioners, fourteen of whom are appointed by the President of the United States and confirmed by the Senate (the fifteenth is the Librarian of Congress, who serves ex officio). Unfortunately, the enabling legislation of NCLIS included a maximum figure for the budget, and we have not yet been successful in having the language removed from the law. As a result, the maximum annual budget of the agency is $ 750,000, and it is usually lower than that because of across-the-board cuts in order to allow the national budget to balance. We still do not know what our current year's budget will be; the range of possibility is from $ 705,000 to about $ 745,000.

This kind of budget makes it very difficult for us to do innovative things. We are fortunate that our legislation allows us to accept gifts and grants, and it is a grant that has permitted the existence of the project that I am discussing today.

II. WHCLIS

You are probably aware that in 1979 there was a White House Conference on Library and Information Services, preceded by about two years of activity and smaller meetings in each of the states and territories. The conference was a success; from the 3000 resolutions brought to the conference by the states, the delegates identified 64 as being of prime importance to the library and information services of the nation. Fifty-five of the sixty-four have been implemented, among them the sizable addition of federal funds to some of the most basic library assistance programs in the country.

The White House Conference of 1979, which was conducted under the aegis of NCLIS, had about 1200 delegates. By law, one third of these had to be library and information professionals; one third had to be friends and trustees of libraries; and one third had to be laymen. Obviously, there was a need to bring together these people for a common understanding of the problems and issues. While the state pre-conferences helped considerably in allowing this common ground to emerge, they could not override some of the deep differences that existed. To this day, you are unlikely to find a conference participant who feels that his or her group was adequately represented and sufficiently vocal; that is, not only single segment of the community believes that the conference was a success for him or her. Each segment believes that another took over the reins of the conference.

III. Decision to Use Hypertext

A. Need to Attain Common Denominator of Understanding

Within this context, President Reagan signed the law authorizing the second White House Conference on Library and Information Services in August 1988, the advisory committee was formed and met for an initial meeting in April 1989, and the first funds were forthcoming in July 1989, for a conference that will take place in July 1991. Nonetheless, NCLIS staff had been thinking about ways in which to approach information dissemination for this conference since before the authorization.

Unlike the first White House Conference, this second conference is mandated by law to have 25% of the delegates be from the library and information community; 25% must be friends and trustees; 25% must be elected and appointed government officials; and 25% must be laymen. As you can imagine, this means that there will be even more diversity than existed ten years ago at the first White House Conference. Only 25% will be information professionals; while friends, trustees, and some public officials may be familiar with some library issues, they do not live and breathe them on a daily basis.

It seemed wise, therefore, to try to focus on an orientation activity that would allow as many people as possible to become acquainted with library and information issues as quickly as possible. Of primary importance would be the attempt to establish some common understandings, so that discussion at the Conference itself would occur smoothly and without breaks that could happen between widely varying groups of individuals. During the preconferences of ten years ago, almost 100,000 people throughout the country participated in the state pre-conference meetings; although the delegates to the national meeting numbered only 1200, many more were involved in the process throughout the years preceding the national conference.

B. Need to Identify Manageable Number of Issues

In addition to establishing a common denominator of information for the participants, it seemed appropriate to attempt to identify a manageable number of issues for this orientation process. The Conference itself will be only four days long; there are, of course, a myriad issues in the information field which could be of significance. However, it seemed unwise, if not actually impossible, to try to cover all topics of current interest. Our decision, then, was to try to create an orientation and self-study program that would acquaint the user with no more than about ten different topics in the field. Among these could be, for example, the issue of funding for libraries; the problem of journal prices; services to minority and rural populations, etc.

C. Need to Assist Varied Groups

Obviously, this program will be used by varied groups. Not only will there be people representing the four different categories that I mentioned earlier; also local circumstances will affect issues being discussed at the state and territorial levels. Probably most important, however, is the differential knowledge of the participating individuals. We determined that we needed an orientation program that could be used to educate people who know virtually nothing about libraries, that could be used as further orientation for those who have some acquaintance with the issues, and that could be used to stimulate the thinking of those who are well-versed in the information field.

D. Need for Portability

Finally, there was the need for portability. Each state will have some kind of preconference activity, and most of the seven territories will also prepare in some way. The orientation program needed to be something that could be easily sent to the state library agency or other state office that would be arranging the logistics for the preWhite House conference activity. It seemed quite natural to think in terms of some kind of computer program to fulfill all these requirements.

IV. Apple Library of Tomorrow

A. Program

Last fall, while we were still discussing these issues, the Apple Company initiated its Apple Library of Tomorrow (ALOT) grants program. In an attempt to stimulate people to think about ways in which Macintosh computers could be used within the library environment, Apple offered grants of configurations of Macintosh computers to successful competitors in their ALOT program.

Right away we wrote a proposal that assumed the use of Hypertext as the basis for an orientation program for the White House Conference, describing the problems and issues that I have just mentioned and indicating that a Macintosh computer would seem an appropriate vehicle for this kind of application. Two of us had just attended the meeting of the Library and Information Technology Association, where a row of Macintosh computers was being used in Hypertext mode to give conference attendees information about everything from conference schedules, to the location of conference attendees, to a guide to local restaurants. The LITA conference attempt had been highly successful, and we believed that a similar effort would soundly enhance the viability and the level of discussion of the White House Conference.

B. Types of Applications

To our pleasure and surprise, a few weeks later we were notified that we had been a successful competitor in the ALOT program, and would receive a rather sophisticated Macintosh configuration (in fact, our configuration has a laser printer, an optical scanner, and a CD-ROM drive, in addition to the more typical basic equipment).

Some of the other winning applications were the Library of Congress, for its American Memory project; the National Agricultural Library, for a cataloguing effort using Hypertext; an Indian tribe, for storing and retrieving the names of words of elements of nature in that Indian language; a school library, for use in its curriculum; and seven other rather diverse projects.

It is interesting to note that the people at Apple had expected to receive no more than about 250 applications for their twelve configurations. Instead, about 1200 applications arrived, leading me to believe that librarians do not lack imagination or creativity where innovative technologies are concerned; rather, they lack resources. Most of us are still trying to find the funds to implement the computer systems to automate our existing procedures; we have not yet found the capacity to turn to the more user-oriented applications of computer technologies.

V. Hypertext Pilot

A. Program Development

Well, the equipment and the software arrived. They came to an office that contained nine people working in a combined UNIX and DOS environment. We had already been having trouble trying to reconcile UNIX (on a 3B2 donated by AT&T) with the several PCs and PC-advocates in the office. And now a third piece of equipment must be dealt with. But we were excited about this project, and wanted to start immediately.

The first thing we learned was that a Macintosh and Hypertext are not the same as a PC and DOS. That is not necessarily bad. However, we had to calculate a learning curve for the staff who would be involved with the project. Three of us became acquainted with the Mac, and we have since hired another Mac devotee - not *because* he is a devotee, but it doesn't hurt. The learning curve for the lead technical person was steep. First, of course, he had to learn the basics of the Mac; then he went on to learn Hypertext.

We decided that the appropriate way to approach the development of this software would be to involve as many people in the library community as possible. We determined that we would rent a booth at the ALA annual meeting, and bring the Macintosh and a pilot program so that people could play with the software and give us their comments. In order to accomplish that, we had to create Hypertext stacks that performed two functions: (1) they had to tell the user what the pilot program was intended to do, and to gather information from the user, and (2) they had to provide some idea of what the ultimate Hypertext software would be.

The software designer simultaneously learned Hypertext programming and designed the pilot software. There are several screens of narrative explanation to the user, indicating what the pilot was about, and giving instructions about its use. In addition, at the end of the short sequence, there are two blank screens with prompts: one enables the user to leave comments and suggestions, and the other allows the user to leave a name and address if he or she wishes to participate in the full Hypertext project.

The sample software shows screens explaining funding for libraries, personnel allocation for libraries, and a brief explication of public library support. Within these screens, the user can request further information, particularly definition of unfamiliar terms. The final product is intended to be less narrative and more graphic; the pilot program was developed so rapidly that we were unable to design many graphics or to use the scanner to scan graphics into the stacks.

B. Pilot at ALA: Responses

Indeed, we were able to borrow a Macintosh for our booth at the Dallas meeting of the American Library Association last July. The experience was truly gratifying. It was the first time that NCLIS had rented a booth at an ALA meeting; we think that at least one thousand people stopped at the booth to play with the Hypertext, pick up literature, stare at the photographs, learn about public library statistics, or talk to one of us.

Many hundreds of people used the Hypertext. We received primarily positive reactions, and much expression of interest in helping with the final product.

Among the major suggestions which have resource implications and implications for a multi-vendor environment are: (1) make the software available for a PC-DOS environment, since it is much more common within libraries than Macintoshes. This is a good suggestion, although I think Apple would not care for it. However, a Hypertext program does exist for the PC, and it would theoretically be possible to convert the Macintosh program into a PC environment. (2) An easier suggestion, although still very important, is that we design the software so that it is not absolutely necessary to use the mouse, since so many people have no experience with the mouse. It was interesting to watch people as they attempted to handle that tool for the first time; the variation in skill and ability is exactly what you would expect. Some people are able to grasp the concepts and the coordination immediately, while others find it very difficult to cope with the foreign object that is not a keyboard.

C. Pilot at WHCLIS

Following ALA, at the annual meeting of the White House Conference on Library and Information Services Task Force in Portland, Oregon, in August, we similarly made the pilot program available for comment. Once again, the response was gratifying. The same general comments were made, but in fact most of the comments were positive and encouraging. (The White House Conference on Library and Information Services Task Force is a group created at the 1979 White House Conference on Library and Information Services, to monitor on a continuing basis the implementation of recommendations from the conference and to work toward the next conference. Starting with a membership of two people from each state, the group has grown in size to about six hundred members, and representatives meet annually.)

VI. Implementation Intentions

A. Contractors

NCLIS now have funding made available from the White House Conference on Library and Information Services to allow us to proceed with the full development of the Hypertext stacks for the preconferences and the conference itself. We made a major decision based upon our experience with the pilot: we would not do the technical work ourselves. Putting together a Hypertext program is a time-consuming and labor-intensive job which involves both computer programming and substantive scripting of the so-called "curriculum" that the user will follow. Since we are such a small staff, we cannot do the whole thing.

As a result, we have determined that the technical, computer programming, aspects of the work should be done by a contractor. We have contracted the work to the person who was responsible for the Hypertext effort at the LITA conference in 1988; she is a librarian with great technical skill specifically in Hypertext. We expect to be working with her during the coming months as we generate the script for the intellectual content of the Hypertext stacks.

B. NCLIS Responsibilities

At NCLIS, we will take on three responsibilities. First, we will monitor the contract and ensure that work is progressing smoothly and on schedule. The state preconferences will begin in about April 1990, and we must have a product ready for these events. Otherwise, of course, the effort will be undertaken in vain.

Secondly, we will determine the content and develop the scripts for the software. Because this requires less technical ability, but definitely requires an in-depth knowledge of the library and information fields, we will involve a staff member who generally is occupied with areas of research in information issues, and with writing and publishing. I expect that she will be a major contributor to the outcome of the project, and will be the person who is on the telephone to the contractor to work out specific issues and questions. As a whole, the staff will identify the areas to be addressed; these will most likely include: literacy; the impact of information technologies; preservation; serials prices; funding of library and information services; definition of basic public library services; and fee versus free services, among others.

Third, we will of course be responsible for continuous reporting to Apple on the progress of the project, and for giving them a final report. Apple is taking an active role with the ALOT libraries, and is working with them to stimulate and encourage the development of the various projects.

C. Library School

Finally, because the work of putting the Hxpertext stacks together is so labor-intensive, we hope to use some library school students to assist us. Dr. Chen's class has been mentioned as a possibility; also we have two library schools in the Washington area where help from interested students may be available to do tasks such as finding appropriate graphics, developing text, writing definitions of words and phrases, and acting as additional guinea pigs for the software as it is developing.

VII. Expected Outcomes

The software will be complete and available for the pre-White House conferences by April 1990. We hope that Apple may be interested in supporting state participation by making other Macintosh or Apple computers available to state libraries for the use of the state conference attendees. We will, of course, also need a series of computers for use at the 1991 conference itself.

We expect that the primary outcome of this effort will be the better understanding of issues by the delegates to the conference, which should in turn improve the productiveness and effectiveness of the conference. A secondary outcome should be the demonstration that Hypertext is very useful for education, especially in situations where varied large groups of people all must ultimately address the same or similar issues.

And lastly, we expect that many libraries will begin to think about other innovative ways in which to use microcomputers in general or Apple computers in particular. I would hope that this project could lead to further connectivity between PC-DOS and Apple equipment - an event that I would welcome mightily.

The use of the microcomputer in library and information situations has clearly begun to reach beyond the mere application of standard software to standard office or library processes, to more creative and innovative purposes. With these remarkable pieces of equipment on hand at relatively low cost, libraries will gradually be able to turn their public service areas into information services of the 21st century.

The Use of LAN in Improving Management and Services in an Academic Environment

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Abstract

A Local Area Network (LAN) connects computers, printers, modems, and other devices located within close distance of each other, often in an office environment. The School of Library and Information Science (SLIS) at the University of Wisconsin-Milwaukee provides a case study of selecting and using a LAN in an academic program environment. LANs differ from each other in their transmission media, topologies, and media access methods. The transmission medium allows the LAN's controller or server to oversee communications among the devices on the LAN. The medium is usually either twisted-pair cable, coaxial cable, or fiber optics. The three media differ in the volume and speed of communications that they can handle. Media access methods determine how the LAN's devices share the transmission medium. Two commonly used methods are the Carrier Sense Multiple Access with Collision Detection method and token passing. The appropriate transmission medium for a LAN often depends on the topology of the LAN's architecture. The four major LAN topologies are the star, ring, bus, and tree. Consideration of these various types of LANs took place during the selection of a LAN for SLIS. The advantages of having a LAN at SLIS have been the sharing of printers and other devices, the use of electronic mail, an increase in access to remote computers, improvement in office management and cooperative research, and easier access to information and files available in the school. The paper concludes with a number of recommendations for administrators to consider when deciding on a LAN in their libraries or library schools.

The Use of LAN in Improving Management and Services in an Academic Environment

1. The Local Area Network (LAN)

1.1 Description

A Local Area Network or LAN is a network of computers. It differs from other computer networks because a LAN serves a local area. For example, it might link the computers in one department of a large corporation. The LAN is special also because the connections among computers in a LAN are made by its own communications technology. The communications links do not employ common carriers, such as telephone lines.

The controller, also known as a server, carries out the functions of the LAN. It establishes, monitors, and controls the communications among the computers and other devices in a LAN. These other devices often include printers and modems. The controller can be a separate device itself, or it can actually be incorporated within the other devices in the network.

1.2 Communications

Why does the LAN not use common carriers like telephone lines to link its computers? After all, telephone lines certainly can handle communications among computers. There are many computer users who today are able to use telephone lines to link themselves with computers all over the world. And it is known that the modern local telephone exchange, such as the private branch exchange or PBX, allows both voice and computer data signals to travel along the same wiring.

However, telephone lines, and other common communication carriers simply are not appropriate for LANs. There are three reasons for this. First, the wiring, sometimes known as the "medium", in a LAN is shared by a number of computers, printers, and other devices. They truly share the wire, for each separate device need not have a separate wire hooking it to the network. Second, the communication in a LAN is peer-to-peer, that is, any device can communicate with any other device. Third, the data rate in a LAN is much greater than on traditional telephone lines.

Signals in a LAN travel between devices at the rate of ten million bits per second compared to the 9,200 bits per second rate found on more traditional communications lines.

The nature of the LAN's communication system limits the distance among the devices. A LAN can handle devices on one floor of a building as long as five hundred feet. In fact, this fits well with the relatively common use of LANs to provide a link between computers and other devices in an office. The maximum length of a LAN depends on the type of cables used.

2. LAN Architecture

2.1 Topology

The topology of a network of computers and other devices is the shape of the network. One can see the shape by drawing a picture of the links among the LAN's controller and its computers, printers, and other devices. There are four major kinds of LAN topologies, namely, star, ring, bus, and tree.

A star topology also is known as a point-to-point topology. In this topology there is a centrally located controller that is linked directly to each device in the network. It controls communications by serving as a switching device or multiplexer. For example, a message from a computer to either another computer or to a printer in the network first goes to the controller, which then sends it to its destination.

A star topology is the simplest of the four LAN topologies to install. Figure 1 shows the star shape of this topology.

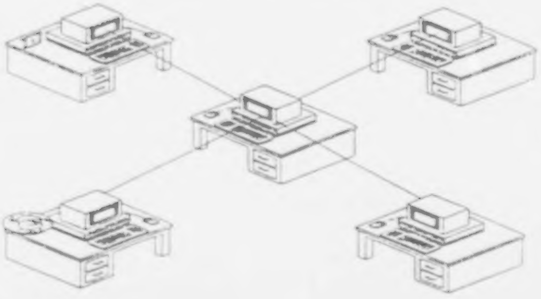

Figure 1: Star Topology

A ring or loop topology consists of a series of devices linked together to form a circle or a ring. For each computer and other device in the LAN, there is a communications line coming into it from the previous device in the ring. Another communications line leaves each device and links with the next computer or other device in the ring. See Figure 2.

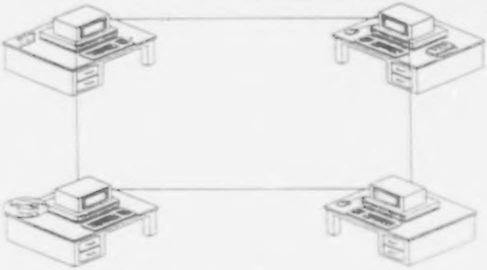

Figure 2: Ring or Loop Topology

Each device in a ring LAN has the potential to be the controller, since each contains the appropriate controller logic. At any one time, the control in a ring LAN usually is assigned to one device. Control moves from device to device as a signal, called a token, passes from device to device along the communications lines. So, control as well as messages pass from one device to another. This is something of a disadvantage because this means that each device must depend on its neighboring devices. For example, someone sending a message from a computer to a printer might be at a location in the network where there are two other computers between the user and the printer. Each of these other two computers will receive and re-transmit the message meant for the printer.

Yet, the dependency that each device has on the others has an advantage. In the terminology of the ring LAN, a failure of control occurs when the token becomes lost or multilated within the device now in control. As figure 2 illustrates, the network is set up so that one of the other devices ought to detect the problem. Upon detection, another device can recreate the lost token and continue the operation of the LAN.

The bus topology, also known as the multidrop or multipoint topology, is the most common topology in LANs. In this topology, the controller device is at one end of one long communications line or bus. The other devices are attached at various points along the line. Therefore, unlike the star LAN, there is no central control hub to which the communication cables are connected. See Figure 3.

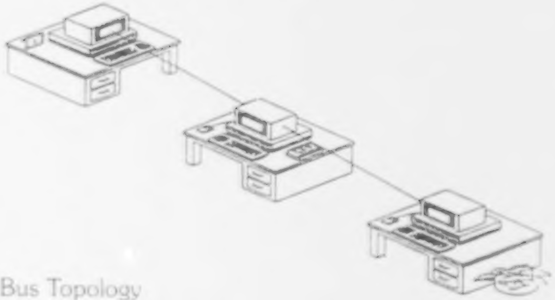

Figure 3: Bus Topology

Communication between devices travels along the bus, but since there is only one bus and all devices are attached to it, each communication is sent simultaneously to each device. Therefore, the wiring is relatively simple, but the bus LAN must be set up so that each device recognizes those messages that are meant specifically for it.

The last type of LAN topology is the tree. It occurs when two or more star or bus LANs are connected together.

2.2 The Transmission Medium

The performance of a LAN greatly depends on the performance of the communication lines, which are known as the transmission medium. Messages among users of the LAN devices should be accurate. The message sent from one LAN user to another should contain the same information for sender and receiver. To ensure accuracy, the transmission medium should be capable of withstanding electrical interference from external sources.

The medium ought to be able to handle typical amounts of messages sent by its users. The medium's bandwidth is the factor that limits how much communication can travel simultaneously through the communication lines. The wider the bandwidth, the more messages the LAN can handle at one time. However, the size of the bandwidth depends on the size of the LAN itself. The size of the LAN can be thought of as the longest distance that any message would have to travel along its communications lines. The larger the size of the LAN, the narrower would be the size of its appropriate bandwidth. In terms of speed of communications, the wider the bandwidth, the faster the communications that can be handled by the LAN.

LANs today use one of three types of transmission media. These are: twisted-pair or ribbon cable, coaxial cable, and fiber optics.

Twisted-pair or ribbon cable has been available for many years, having even been a component of telegraph systems. It is inexpensive, readily available, and adequate for many LAN applications. It also requires little technical skill to install. Hand tools are all that one needs to connect the cables. Twisted-pair wire is manufactured into a variety of forms. The wires are copper and are formed into sheaths that consist of from one to several hundred pairs of wire. It also comes in flat ribbons for installation under carpet, and in a plastic-sheathed cable for installation under the floor. It is durable and capable of withstanding considerable abuse. With its sheath intact, it is even impervious to the weather. The bandwidth of twisted-pair cables can handle high-speed communications.

Despite the advantages mentioned above, there are some drawbacks of the twisted-pair cable. Its bandwidth is too narrow for multiple access networks, such as those LANs having a tree topology. It is highly susceptible to interference. Unless the cable is shielded, electrical impulses from external sources such as elevators and industrial equipment can garble messages sent via the LAN. Therefore, when a LAN with bus or ring topology uses twisted-pair cables, the network will be restricted to low-speed applications.

Coaxial cable or coax is the most commonly used transmission medium in LANs currently on the market. This popularity comes from its inexpensive cost, ease of installation, and wide bandwidth. Wide bandwidth means high-speed communications. This makes coaxial cable appropriate for star and tree LANs and even for LANs that communicate video messages. At the center of a coaxial cable is a single copper wire that is insulated by a foam or plastic sheath or by plastic or Teflon discs spaced at regular intervals along the cable. The outer shield is either a semi-rigid copper or aluminium tube or a flexible braid. These layers of material protect the communications on coaxial cable from interference. One of the drawbacks of a LAN with a coaxial cable medium is the need to employ its entire wide bandwidth when sending messages through the cable. There are various solutions to this problem, including a method of dividing the cable capacity into segment or channels.

Fiber optics are becoming an important communications medium for LANs. Fiber optic conductors are tiny pipes made by depositing layers of a pure silicon substance on the inner surface of a glass about three feet long and 1.5 inches in diameter. Fiber optics have an enormous bandwidth and can simultaneously handle computer, voice, and video communications. The wide bandwidth also means high transmission speeds. Furthermore, fiber optics are immune to noise from external sources.

However, there are several disadvantages that limit the application of fiber optics to LANs. First, the technology is expensive. It uses a sophisticated and costly combination of electronic and light technology. Second, installation requires special tools to splice glass fibers and to align fibers precisely. Third, fiber optics are not readily fashioned in a bus cable to which computers and other devices could be attached. So, bus and tree LANs usually cannot use fiber optics. A LAN with a star or ring topology is much more appropriate for fiber optics communication lines. And there are even ways to set up fiber optics on a star LAN so that the network simulates a LAN with a bus topology.

2.3 Media Access Methods

Users of a LAN cannot communicate truly simultaneously, even in a LAN with a very fast communication medium. This is because the users and their devices share the communication medium. One responsibility of the LAN controller is to determine which device has the right to communicate at a given instant. To make these decisions, the controller follows a media access protocol. There are two commonly used media access protocols: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) and token passing.

The Carrier Sense Multiple Access with Collision Detection protocol involves three major concepts. First, carrier sense means that each LAN device waits for the presence of a carrier signal before sending a message via the LAN. Second, multiple access means the LAN is indeed a network; it is shared by several users. Collision detection occurs when a device sends a pulse while it is waiting to transmit its message; whether or not its pulse collides with another signal tells the device if another message is being sent.

Basically the CSMA/CD protocol is similar to a telephone party-line protocol. Each device listens before it tries to communicate. If the line is not busy, the device talks; if the line is busy, it waits until the line is clear. This waiting for an opening in which to send a message has led to the idea of contention. LANs that employ CSMA/CD protocols are known as contention networks. A big advantage of a contention network is the simplicity of designing into the LAN the method for deciding whose turn it is to send a message. A major disadvantage is the time spent in listening to see if the line is clear.

Token passing is another media access protocol. LANs that use it are known as noncontention networks. Decision making is simple in this method. Whosever computer has the token is the computer that can send a message via the LAN. Thus, there is only one token in the system. It travels from device to device, being stopped by any device that needs to send a message. Once the message is sent, the token continues on its circuit of the LAN. The token will not go to just any device in the LAN but only to the next device in the token's predetermined sequence. One reason to use tokens is to have a predictable response time for user communication. In a deterministic network such as a LAN using tokens, each user receives a proportionate share of the network time. Ring and bus topologies are most appropriate for the token protocol.

3. Case Study of a LAN Application

3.1 SLIS

The University of Wisconsin-Milwaukee School of Library and Information Science (SLIS) began using personal computers in the early 1980s. Uses for the computers have included both office management and instruction. At first the SLIS used Apple computers for instructional applications and Wang word processors in office management. In 1986, SLIS moved all office tasks and many instructional applications to IBM personal computers and their compatibles. Although the SLIS has retained and increased its collection of instructional Apples, it discarded the Wang computers.

Currently, the School has forty-five personal computers spread around its half of one floor of the eleven story building known as Enderis Hall. The computers are found in the administrative offices, faculty offices, and instructional laboratories. There also is an extensive collection of printers, including a laser printer in the administrative area of the floor. The office personnel consists of two fulltime staff and two FTE student help. The School has 181 enrolled students, a Dean, an Assistant Dean, nine fulltime faculty members, a resource center manager and three graduate assistants.

During the first half of the 1980's SLIS personnel found many applications for its computer resources. It became common practice to use first Wang and then IBM personal computer word processing systems to handle all administrative correspondence. Internal communications with faculty and staff relied heavily on an electronic mail system available on the campus mainframe computer. And the School began to convert paper files into machine readable form. These files included students records, alumni files, mailing lists, course syllabi, budget and equipment inventories.

3.2 Need for a LAN

The administrative staff and faculty became more and more proficient in the use of their computers. They also became more dependent on these tools. The proficiency made it appropriate, and the dependency made it almost a requirement to link all the personal computers together into one local area network. The advantages centered around sharing peripheral devices like printers; communicating with each other by electronic mail; and increasing access to computers elsewhere on and off campus.

An analysis of the School's computer and communication needs indicated that a LAN would be quite appropriate. After this analysis, we examined the technology itself. We obtained information from trade publications and from various LAN vendors. Analysis of both our needs and the technology convinced us to look for a LAN system that would work with the computer equipment already available in the School. We studied the School's projected growth and the need for expansion of both office and instructional applications of computers and communication systems. The ever-changing nature of LAN development and the expected growth of SLIS made us come to the conclusion that our first LAN installation would need to be upgraded within a few years.

3.3 SLIS-LAN

Before purchasing the 3Com LAN in 1987, SLIS had considered several alternate LANs, namely, AT&T StarLan, Novell, and Corvall. All four of these LANs could provide the basic requirements and services of a LAN.

The criteria for the selection were based on the following factors:

1. Processing speed, especially when dealing with databases in a medium traffic flow environment;
2. Hardware expandability;
3. Internetwork capability, i.e. communication with other types of networks, such as AppleTalk;
4. Operating system features such as system security and electronic mail;
5. Support of existing SLIS software and hardware;
6. Product reviews from various computer magazines.

We considered these factors as well as consultation with several computer specialists and end users in our evaluation of all these LAN products. 3Com stood out because of its performance as well as capability in connecting the IBM-PC with Macintoshes.

SLIS-LAN consists of three controllers or servers: a 3Server3, a 3Server401 and a Northgate Elegance Model 1000. The first was purchased in 1987, and the other two in early 1989. The 3Server3, a 80186-based server, has 70mb disk storage. The 3Server401, a 80386-based server, is installed with 150mb disk storage and a 150mb tape backup capacity. An AppleTalk network is connected to the 3Server401 and provides support to the Macintosh users. A 2400-baud rate modem is attached to the 3Server401, providing remote access service. The Northgate Elegance Model 1000, a 80386-based PC, is equipped with 80mb harddisk. A multi-user CD-ROM network, CD-NET, is connected to the Northgate server.

Several multi-user software programs are available on the LAN for instructional and administrative applications. Foxbase Plus is used in two advanced microcomputer courses. The SLIS Student Information System and Serial Control System have been developed using FoxBase. Framework III (FW3) is used in the administrative office as well as the instructional laboratory. The electronic mail system in FW3 is heavily used by the faculty and administrative office staff. Drafted documents are sent through the e-mail system for editing. A Hewlett Packard Laser IID printer generates envelopes using the printer envelope option. The process of preparing documents is fully automated and requires much less paper flow than before the LAN was installed.

3.4 Living with the LAN

Converting paper files to computerized databases and making the databases available via the LAN has helped the administration, the office staff, the faculty, and students. For example, we are now able to obtain information from a student's record without removing files from the office area. Faculty members can look up a student record without leaving their offices and can do so at any time of day or night, thus preventing the frustration of a locked cabinet late at night. Updating student files as well as alumni has become more routine, expeditious, and accurate now that the office staff always has access to files via the LAN.

A LAN is a tool that links. It not only links users and their computers; it also links information. For example, a faculty member can use the LAN to prepare for a meeting with his/her advisee. The LAN provides not only the student's record but also the schedules of present and future course offerings. Therefore, it can help advisee and advisor link the student's history and interests with courses available in the future. Information on the appropriate sequence of courses, who will be teaching future courses, and at what time is all available from one source - the LAN - rather than from a multiplicity of paper files.

Communication among faculty has improved when the LAN is used in addition to or instead of the campus electronic mail system. (The campus system remains available to users of the School's LAN.) The LAN electronic mail system has greatly decreased the number of handwritten or typed memos between faculty members. Response time to requests for information or inquiries about potential meeting dates has become quite rapid. Interestingly, the easy to use electronic mail has made memo writing take on a new personal and sometimes even very informal flavor. Faculty communication is now very timely and current and at the same time less time consuming. Consultation on some personnel and budgetary matters can be done without the need for formal meetings.

Excellent printing has become so easy and convenient since faculty and staff have been able to send documents to be printed from their personal computers to the School's laser printer. They can have the printing of large documents done overnight. At the same time, the faculty and staff can still have shorter documents printed on the dot matrix printers available in their own offices. The School's laser printer has helped the office and administrative staff, too. We can now save a significant amount of money by using it to produce our own brochures, announcements, and press releases and most recently the SLIS occasional paper series on our desktop publishing workstations.

Exchange of opinions and jointly written papers and articles have become more possible for us than ever before. This is so because the LAN provides one common area when all users can store and retrieve files. This section of the LAN even has the ability to make some files readable but not editable and to make other files accessible only to users with a password. This is particularly important in the case of student, budget, and personnel files.

By using the LAN we have been able to standardize software usage at SLIS for those documents that will be handled by the office staff. Of course, individuals can use any software they wish when using their individual office personal computers.

3.5 The Future of LAN at SLIS

Our future plans call for linking all the IBM-PC and compatibles with our Macintoshes in the SLIS Information Technology Laboratory. The Macintoshes include Mac SEs, SE/30s and IIs. An Apple LaserWriter IINT is also available in the laboratory. At this time, only two Macintoshes, one in the administrative office and one in a faculty office, are connected to the SLIS-LAN. This installation will enable all members of the SLIS, including students, to interact and share resources. With such internetworking, we would be able to share the cost of expensive resources such as high-capacity storage units, links to off-campus computers, and expensive application software.

Presently, LANs are used a great deal primarily in business-oriented applications. That will certainly be their predominant role for the next few years. It is predictable that as the LAN technology matures, demand increases, and prices drop, the LAN will become a household device. This high-speed network could be used to control lights and appliances, distribute audio and television entertainment, connect to external networks, monitor and control energy devices and alarms, and perform many other tasks.

At this time, there is limited number of library application software available for LAN environment. As the technology advances and the prices drop, more library applications will be designed to run on a LAN as it is becoming more affordable for libraries to install.

In the future, internetworking will be an important component in a LAN operation. Connecting with other networks running on different operating systems enhance the communication and reduce the incompatibility among systems.

At SLIS or at home, applications of LAN are limited only by human imagination and available technologies. We have only so much as glimpsed the power of local area networks.

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Micromation Prospects for Standards Libraries in Industrialized and Developing Countries

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Micromation Prospects for Standards Libraries in Industrialized and Developing Countries

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Abstract

Standards libraries are special libraries found all over the world, e.g. in standards institutes, companies, technical organizations, or as reference collections within academic libraries. Despite their variety of tasks, they all face an ever-growing demand on normative literature in conjunction with the increasing internationalization, growth and sophistication of standardization.

The use of microcomputers has proven to be a powerful means to meet this challenge. The paper presented here discusses some micromation prospects for this special kind of library. After introducing the institutional framework of standardization, the scope of applications is described, including library and office automation, information management and documentation. An outline of existing tools and solutions is given by way of selected examples from both national and multinational level.

Keeping this background in mind, future prospects for standards libraries using micromation are derived from needs and deficits, rather than from technical innovations. The main issues are the global and multilingual availability of software and data, and improvements in microcomputer-aided access for full text. The conclusion is reached that fulfilment of these expectations will help to meet urgent requirements of standards libraries such as "less paper, greater speed, easier access" and, subsequently, better services.

Micromation Prospects for Standards Libraries in Industrialized and Developing Countries

General Aspects

Special libraries have to find their special approach to microcomputer use for various reasons. In most cases, special libraries are closely linked to the corporate world, rather than to the library community. Hence, they have to meet institutional requirements in the first place, even at the cost of neglecting codes of library practice. This may limit the possibilities for co-operation, but, on the other hand, may allow greater flexibility of decisions and operations - especially in microcomputer applications.

Furthermore, the tasks of special libraries often cross the borders of library functions and duties in their commonly accepted sense, as they are also involved in documentary and archival activities, project management, technical assistance, consultancy etc. That means, in the type of library in question, the use of microcomputers must not only be a tool for automation of library routines, but an electronic working aid able to cope with a highly diverse range of applications - referred to in this paper as micromation, i.e. application of microelectronics in a specific field.

Finally, special libraries are usually integrated in a scientific or technical community, corresponding to their subject discipline or interdisciplinary sector. The world of science, technology and trade now crosses all frontiers, so that nearly all special libraries find themselves faced with the demands and opportunities of an international network of companion institutions, located in both industrialized and developing countries. Accordingly, micromation policies of special libraries have to take account of different economical and technical conditions in order to ensure the possibility of global co-operation.

Discovering new microcomputing opportunities for special libraries in the 1990's necessarily involves consideration being given to the issues mentioned above. But future micromation prospects will also depend on the development of the information market in the library's specific subject field. This paper aims to give a view of the micromation prospects for a certain kind of special library: for standards libraries.

Standardization and Standards Libraries

Telling computer experts that standards are needed would be carrying coals to Newcastle. However, only a few experts are likely to have any in-depth idea of standardization [1,2]. Thus, in order to clarify the particularities of the libraries' micromation approach in this field, it is worthwhile explaining: what is characteristic for standards (seen as a certain kind of document), what are the features of libraries collecting this document type, and what is their rôle in respect to bibliographic information and document supply.

Investigating characteristics of this peculiar type of document, one will find that standards are

- inseparably linked with other standard-type documents such as technical regulations, codes of practice, guidelines, etc., subsumed under the generic term "technical rules",
- to be considered as unconventional or so-called "grey literature" usually not distributed by book trade facilities,
- the product of a number of stages, from internal papers to published drafts and, finally, to approved editions,
- published as part of standards collections or series usually with alphanumeric designations,
- issued in different grades of formal consensus (standards, pre-standards, technical reports) and at different levels (international, regional, national, provincial, sectoral, company),
- "living" documents which will be amended, supplemented, revised, replaced by other documents, or withdrawn, instead of being subject to a half-life period,
- only the primary part, as single documents, of a huge range of standardization literature, published in monographs, series, handbooks, bulletins, journals.

Clearly, collecting and handling such "hard stuff" is not an easy task for libraries. However, there are a lot of facilities all over the world, with smaller or greater collections of standards. These standards libraries have to

- come to terms with various corporate situations, e.g. in standards institutes, companies, or in libraries of technical universities,

- maintain their standards stock (or part of it) as a reference collection, generally not available for circulation or inter-library loan,
- update their files permanently by adding new documents, by discarding superseded or withdrawn ones, and by revising the collections regularly,
- cope with increasing quantities of paper additions, causing growing space and man-power requirements for storage and handling,
- handle (in most cases) not merely standardization items, but the full spectrum of normative literature (certification, testing, quality control, metrology, etc.) as well as technical and general reference literature.

Standards libraries play a vital rôle in standards information. Although their specific duties depend a great deal on the corporate situation, some general patterns are observable. In many cases, standards libraries are

- part of a standards information centre or, vice versa, such facilities are part of the library,
- the document procurement facility and reference source for standards databases,
- an intermediary for user access to external standards databases,
- the compiler of printed standards information services as bibliographic bulletins, indexes, etc.

However, the contribution of libraries to the supply of standards documents is inevitably rather more modest, often restricted to in-house users or exceptional external demands for reasons of copyright and budgetary interest. The regular document delivery service is usually run by the sales department of the national standards body, being the sole sales agent and vendor for standards of domestic, foreign, or international origin.

Micromation Objectives and Scope

The general micromation objectives for libraries are simple and undisputed. Microcomputers should help to introduce new and better services, to provide access to electronic information sources, and to cope with an ever-growing workload.

However, applying these goals only to the management of standards collections would be far from sufficient. It should be clear from the explanations given above, that standards libraries are much more than just libraries of standards. Consequently, their micromation approach has to cover a comprehensive scope of applications.

In terms of manpower and number of volumes (monographs and periodicals), most standards libraries are to be considered small - in both developing and industrialized countries. The size of the library implies some specific requirements, limitations, and possibilities for their micromation, which, in the case of small facilities, has been discussed in a recent paper [3]. One of its basic findings is the necessity of a step-by-step implementation policy.

In fact, one will rarely find a standards library, which has already exhausted the application scope presented here. The reasons are diverse, but are probably due to one or more of the following problems:

- shortage of funds for equipment and software investment - especially in developing countries,
- difficulties caused by language barriers and character representation,
- lack of appropriate information sources and software packages,
- non-existence of sufficient telecommunication infrastructures,
- incompatibility of hardware, software, and data,
- contradictions with mainframe/mini computer solutions already developed, especially in industrialized countries,
- impossibility of funding services (initially) less in demand,
- lack of know-how and computer literacy.

Existing Tools and Solutions

Any micromation venture depends on the availability of suitable tools, first and foremost, of an appropriate database management system. The CDS/ISIS software, developed by UNESCO, meets a lot of the requirements of standards libraries, being

- destined for bibliographic and other textual applications with the advantage of a variable field length feature,
- designed so as to be menu-driven, adaptable and with a strictly multilingual structure,
- implemented in various language versions,

- prepared for migration from micro to mini or mainframe computer solutions,
- distributed free of charge to non-profit institutions in UNESCO member states,
- compliant with an internationally adopted exchange format ISO 2709.

Basically, CDS/ISIS is a simple but powerful generalized information storage and retrieval system, designed specifically for the management of an unlimited number of structured non-numerical databases. Recently the enhanced version 2.3 [4] has been released, replacing the first version as of 1986.

Although this software does not have a relational file structure, the new version provides a record linking device, which allows, for example, a bibliographic record to be linked to a vendor record, or to a user record as well. Altogether, in standards libraries CDS/ISIS is capable of operating multiple applications under a single user surface, including library housekeeping, documentary activities, referral services, and administrative tasks. This will be illustrated by two examples.

The first example demonstrates a multinational solution for information management in the field of standardization completely run by UNESCO's database system. The African Regional Organization for Standardization, ARSO, operates its Documentation and Information Systems Network, DISNET, with CDS/ISIS software, distributed on 20 microcomputers in different African countries in the French/English version. The exchange of data is still managed on diskettes, but online access is envisaged for 1990. In a number of participating countries, the libraries of the national standard bodies act as national focal points within this information network, providing data input and user access facilities. The main applications carried out by CDS/ISIS concern databases of

- standards and technical regulations, AFDOC,
- books and other technical documents received by the library, LIBAF,
- national standards bodies of member states, DIRSO, and
- specialists in the field of standardization in Africa [5].

The second example of applications is provided by the library of the German Standards Institute, DIN, where CDS/ISIS is assigned for all tasks managable by database software, namely acquisition, cataloguing, and circulation of monographs, reprints documentation, management of referral data, and document procurement/supervision as well as general administration [6]. By means of the powerful print formatting facilities, catalogues and referral services are scheduled for periodical laser printed dissemination, whereas staff searches are conducted online. However, the institute's standards database is run by the German Information Centre for Technical Rules, DITR (incorporated in DIN), on a mainframe with different software, but CDS/ISIS is now implemented as a tool for microcomputer-based external data entry.

Another recently introduced micromation tool which needs mention relates to access to normative bibliographic data. PERINORM, the monthly updated compact disc on standards and technical rules and regulations, is recognized as the world's first CD-ROM being all-in-one multinational, multilingual, and multi-database, i.e. produced by collaboration between the national standards bodies of Germany, France, and the United Kingdom, making it retrievable in both German, French and English (user surface and contents), incorporating their different databases DITR, NORIANE, and STANDARDLINE. Not only for that reason, this easy-to-handle product obtained the "Award of Excellence" of the International Information Management Congress.

PERINORM contains up-to-date and detailed bibliographic entries on all current, full and draft standards and specifications for all three countries plus all European and international standards produced by ISO/IEC and CEN/CENELEC. In addition, there are records for those technical rules and regulations that are applicable to France and the Federal Republic of Germany, adding up to a total of some 90 000 records.

For standards libraries, this versatile information product provides not only an indispensable bibliographic data source, but a monthly updated ondisc catalogue of a major part of their collections. As a matter of fact, PERINORM enables library staff to

- answer user queries on-the-spot,
- provide current awareness by subject, publisher etc.,
- support management of document collections, and
- assist rapid access to full text documents in hard-copy or microform.

The spectrum of micromation tools for standards libraries, of course, is not limited to the examples given above. In order to verify the expanding range of PC approaches to standards information, I would like only to mention the various systems especially designed for company standards libraries (often entitled "bureaus") such as Krupp-Atlas' DOKAS and Ruhrgas' TNO systems, developed by two major companies based in Essen. These systems are fed by data from DITR as well as by their own data entry procedures.

One of the few full text examples known to me to date is the 1989 edition of the ASME Standards Code on a single CD-ROM, replacing 24 bulky volumes and over 65 kilogrammes of paper. This code, issued by the American Society of Mechanical Engineers, is widely used and highly regarded internationally. It sets out safety rules for boilers, pressure vessels and nuclear power plant components. The whole text is fully searchable, with links to diagrams, charts and tables, provided that the additional hardware requirements (high resolution screen, graphic interface cards) are implemented on the user's configuration.

Micromation Prospects

After having reviewed the existing microcomputing tools and solutions in some detail, I would like to turn to the future. But it should be stressed that the situation reported so far still includes a number of future prospects, because "existing" in no way implies "implemented" on a large scale, especially in developing countries. Hence, the most important short term micromation prospect for standards libraries is the exhaustive application of the micromation potential at their disposal. I know this is easy to suggest but hard to do, owing to the obstacles I have mentioned earlier. After all, it seems to be wise not to revel in technical speculation, but to derive future microcomputing opportunities from known or predictable deficits and challenges. The main issues are problems raised by software diversity, lack of information access and availability of full text. Future developments will be influenced by a complex network of external stimuli, of course.

Looking at the prospects concerning software, the premier issue should be to move towards "standard" or unified solutions instead of proliferating individual isolated implementations. In the standardization community, which is constituted internationally, this can best be achieved with an international approach in terms of availability and multi-lingualism. This approach must comprise both the developed and the developing countries. Thus, CDS/ISIS - serving as a "Software Bridge" [7] between the information-rich and the information-poor fractions of the world - offers an encouraging perspective. UNESCO should authorize regional standards organizations as software distributors for their member bodies, following the African example, and should continue to support regional training activities as well.

With CDS/ISIS applications, standards libraries will retain enough flexibility to meet a great proportion of their library and information management needs. The more widely used this software tool is, the greater will be the benefits arising from the exchange of experience and transfer of database definitions, print formats, and, subsequently, data. The appropriate framework for co-ordinating these activities would be the informal information network of the International Organisation for Standardization, ISONET, in which standards information facilities all over the world participate. To estimate the resulting advantages adequately, one should be aware that all these libraries have to deal with the same items to a great extent, apart from differing language situations.

Nevertheless, there are a lot of expectations and demands for future improvements and enhancements of CDS/ISIS. I will confine myself to a few examples. It would be beneficial to have a(n)

- graphic-oriented mouse-driven WYSIWYG user surface, maybe as an option for inexperienced users,
- greater distinction between the system administrator and user level,
- multi-choice windows listing available databases, print formats etc.
- word processing and spreadsheet interface,
- selection of data exchange formats,
- increased error tolerance in case of incorrect interactions and
- simplified string search mode.

However, bearing in mind that it took three years to develop the second version of CDS/ISIS, one should not look forward too impatiently to receiving further upgrades.

Turning to micromation opportunities concerning access to standards information, I can keep on talking about the same software. As reported in numerous papers at length, CD-ROM is an ideal means for distributing bibliographic databases independently of telecommunication infrastructures, in particular in developing countries. A UNESCO supported pilot project, conducted by the Pan American Health Organization, has proved the capability of CDS/ISIS to operate a CD-ROM database distributed to hundreds of sites in Latin America [8]. I consider this a very promising approach for managing access to standards information, especially in regions or countries with many remote locations of standard libraries such as China. Such a solution would avoid cumbersome and confusing diskette operations and shortage of hard disc storage capacity on local microcomputers.

As stated above, information access will depend a great deal on future developments of the information market. The current trend suggests that, sooner or later, most online database services will yield correspondent ondisc products. Hence, the spectrum of suitable CD-ROM discs available in the field of standardization will undoubtedly broaden. At least, standards libraries can expect for the 1990's to have at their disposal

- an enhanced version of PERINORM, the CD-ROM on standards and technical regulations, with coverage of additional European countries,
- new and urgently awaited CD-ROM services with bibliographical data of national and voluntary standards from other industrialized countries or regions, in particular from the U.S.A.
- optical discs with supporting information such as multilingual terminology and technical definitions related to standardization as well as corporate and company data for the location and selection of clients, vendors, information agencies etc.

In order to evaluate the CD-ROM prospects given, one only has to consider the problems standards libraries have in overcoming the language barrier and the concordancy difficulties, raised by the frequent task of retrieving equivalent, related, or at least similar standard type documents from different countries in different languages. Provision of cross reference entries, if at all retrievable, cannot satisfy all enquiries. In such cases, multinational and multilingual search facilities are a prerequisite to produce a standards synopsis for a given subject with reasonable effort and expenditure.

In some cases standards libraries need instant access to in-depth up-to-date information provided only by the originating standards databases. Unfortunately, the future prospects for online services in the field of standardization are less promising. Besides the telecommunication requirements, a number of obstacles and difficulties remain, with no significant tendency for changes and improvements in sight. Although some efforts have been made to join forces, standards databases are (and, in the near future, will remain) implemented on various national hosts [9] with different contract requirements, different command driven retrieval systems, different scope and presentation of fields etc. Despite these well known and often lamented problems, standards libraries cannot dispense with online perspectives as a whole, but will be forced to concentrate on scrupulous selections, if possible.

One of the indispensable choices will be the European Standards Database, ESD, now under preparation by the Commission of European Communities which is planned to combine two files. The first is INFOPRO on standards work in progress at national, European, and international level (implemented within the framework of the Commission's Information Procedure on Standards). The second is a comparative index on standards in Europe, ICONE, giving references of national standards incorporating European or international standards with or without deviations (based on a project conducted by the European Commission for Standardization). It is intended to expand the scope eventually to those national European standards, which have not yet any corresponding document at the levels quoted, but all entries will be given only in short title presentation.

A more positive online view for standards libraries is provided by the marketing strategy now under course of implementation in the German Information Centre for Technical Rules, DITR, which aims at overcoming the obstacles of scattered information sources. The DITR database is accessible on both FIZ Technik and PERGAMON hosts, the latter in common with the British standards database, in order to provide convenient access for international use. DITR's documentation scope is designed as an answer to the challenge of the European single market scheduled for 1992, as well as the needs of the company standards libraries (or bureaus) in trade and industries. Thus, DITR provides or is about to provide in a unique format, with German-English retrieval facilities, access to

- international and European standards and technical rules, including ISO, IEC, CEN/CENELEC, ECMA, OIML, CCITT, CEPT etc.
- national standards of all German speaking countries, i.e. Germany (F.R.G. and, planned for the future, G.D.R.), Austria and Switzerland,

- other technical rules and regulations published by German voluntary institutions and public authorities, including VDI, VDE, FTZ, and
- an ever-increasing number of internationally regarded U.S. standards, including ASTM, ANSI, UL.

A desirable feature for standards libraries is the option of online ordering, leading us to the remaining question of full text access. This is always a central issue for libraries, because access to bibliographic information only enables target documents to be identified, which in most cases is nothing more than a first and somewhat instrumental step towards satisfying the users' needs. The chief task of the libraries in question is to provide access to the contents of the standards desired. From the librarian's point of view, micromation prospects in the full text domain should assist in coping with the

- enormous work load caused by decentralized filing, updating, supervising and rearranging the shelves (administrative or man-power problem),
- continuous growth of shelf capacity requirements, due to an ever-growing number of paper additions (stack space problem),
- insufficient holdings protection, as proved by the discouraging everyday experience of "missing" documents, perhaps due to theft or only to filing error (stock security problem),
- cumbersome ordering procedures, at the expense of time, money and paper work for acquisition or reacquisition of individual documents (procurement procedure problem) and
- lack of full text retrieval facility and of processability of algorithms and data, as are incorporated in an increasing number of standards (contents access problem).

What will be the micromation opportunities of standards libraries for solving these problems in part or as a whole? This question cannot be answered without considering the nature of the libraries' collections, consisting of up to millions of pages, containing mixed text, graphs, tables and images, sometimes even including colour. A single complete collection of national standards of any major industrialized country alone exceeds a total of 120 000 pages. The all-over update rate (additions and deletions) is to be estimated at 10 per cent p.a. In most cases, particularly in standards depositary libraries, the access frequency is quite different for parts of the holdings, depending on the documents' language, origin or subject. Thus, it may be suitable to envisage varying solutions according to levels of demand.

There are two main technical options regarding the location of the full text information, i.e. accessible either by local storage means or by telecommunication from remote databases. Furthermore, one has to distinguish publisher-produced (EP approach) or library-produced (archival approach) creation of full text media. Possible kinds of microcomputer aided access to standards would be original, facsimile, encoded, processible or any combination.

The most promising perspective for a comprehensive solution is provided by the emergence of the WORM (Write Once Read Multiple) technology, provided standardization of this media will succeed. Today, it is still at the stage of CD-ROM in its early days, but offers some advantages, allowing users to

- store as much as 6.4 Gigabyte on a single double-sided disc, produce full text products regardless of critical quantities of copies,
- compile individual full text compilations depending on the special needs of each library and
- expand the total storage capacity up to 13 Terabyte (equivalent to more than 200 millions of pages) by jukebox mechanism.

While this "Giga-solution" represents the high-end option achievable only for well funded standards libraries, the low-end solution is provided by microform media, unrivalled in terms of costs. Publisher-produced microfilm services of standards are on sale from major industrialized countries. Microcomputer-aided management of image location and equipment automation could be an aid to revitalize the interest in this well established technology, particularly in standards libraries with limited budgetary resources, as is commonly the case in developing countries. However, the microfilm approach is best suited for less frequently needed parts of the holdings, just the parts not likely to be available on microfilm, which leaves the dilemma unsolved.

At present we witness the advent of erasable optical discs based on M O (Magneto-Optic) technology, providing 650 Mbyte on a removable double-sided 5.25 inch disc. Surely, this will be not the last initiation for the decade to come, competing with an increasing number of existing high volume storage alternatives. One may think of broadband telecommunication concepts such as ISDN (Integrated Services Digital Network), which enables the present obstacles to online remote access to central full text databases to be overcome, and saving the individual libraries from worrying about any of the problems cited above. Standards libraries should try to keep abreast with all these developments, in order to be prepared to choose the right thing at the right time.

Obviously, full text is going to become the essential issue in standards information in the 1990's. This is confirmed by various research projects in which the German Standards Institute participates. Two of them are conducted within the framework of IMPACT (Information Market Policy Action), and investigate methods for the harmonized production of European standards, developing a natural language interface using distributed intelligence (Alpha Dido). Another project is under way to provide procedures for electronic delivery of standards contents under the auspices of an ESHD (Electronic Storage and Handling of Documents) task group within DIN's Committee for the Application of Standards.

Full text developments will be promoted externally by diverse standard-related stimuli and trends such as Electronic Publishing with the SGML (Standard Generalized Markup Language) approach, CALS (Computer-aided Acquisition and Logistics Support), recently introduced by U.S. procurement authorities, or the various computer-aided methods of AMT (Advanced Manufacturing Technology), all depending on machine-readable standards full text and data. Having a lot in common with technical documentation, standards contents will also be subject to hypermedia applications as well.

These few remarks should be sufficient to prove the necessity for standards libraries to strengthen their full text capabilities, in order to provide an adequate infrastructure for future challenges. It should be stressed that the only way to succeed is to take pains to improve the staff's microcomputer and high volume storage management skills.

Conclusion

What will really have been changed by the end of this millenium with regard to microcomputer use in standards libraries? I can agree with the doyen of library experts in information technology, Richard De Gennaro when I say: "We have no choice but to assume that print materials will continue to coexist along with information in electronic form" [10]. Quite probably, in the short term this will not reduce the total running meters of our stacks tremendously, due to the ever-increasing creation of new standards. But it's time to "shift gears" (to cite again the man to whose honour this year's Symposium is dedicated) and to look forward to the standards library of the future, accommodated in a cabinet of wardrobe dimensions, containing millions of pages, each document accessible within less than 10 seconds. The hardware is already available, but not yet the money, expertise, organization, legal preconditions and software standards.

The more serious short term savings will be the substitution of paper in library administration and processing. Micromation in conjunction with telecommunication facilities will enable standards libraries to perform instant transactions, accelerating response to users' needs and management tasks. It is in this sense, that realization of the micromation prospects for standards libraries discussed in this paper will help them to meet today's urgent requirements such as "less paper, greater speed, easier access" and, subsequently, better services.

To summarize, we may expect to see changes from individual to unified software solutions, from online to ondisc information access and from paper to full text on optical media. Fortunately, the developments discussed for software and information access offer prospects of narrowing the gap which divides industrialized and developing countries. However, the expenditure involved in full text micromation increases the risk that existing inequality will be preserved. Thus, economical and technical support for developing countries in the full text domain has to be an essential issue of the 1990's. Ultimately, we must make sure that we all share one world with a global free flow of information.

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The Use of Microcomputers in Israeli Public Libraries

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The Use of Microcomputers in Israeli Public Libraries

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Abstract

Automation of Israel's public libraries lagged behind that of the university libraries, which at present use a VAX-based package, ALEPH, developed at the Hebrew University during the 1980s.

The need felt by public librarians for computer assistance has been met by two major software packages:

1. LMS+, from TOP Systems of Tel-Aviv
2. ALEPH-PC, a trimmed-down version of the ALEPH software

The LMS+ system was adopted by the Center for Public Libraries as a national standard in 1988. Its installation at numerous libraries throughout Israel facilitates the Center's role as a provider of cataloging data and catalog cards. As a result, a quasi-network based on PCs, with independent housekeeping for each library, with the option of downloading cataloging records from the central database, is emerging.

Such a network, which avoids problems posed by Israel's inadequate data communications infrastructure, may be a useful model for other countries.

The Use of Microcomputers in Israeli Public Libraries

1. Introduction

We are nearing the end of a decade that has seen the world transformed by a device that was in infancy at its beginning - the personal computer. Library automation, which was still in its formative stages at the start of the 1980s, has been heavily influenced by the rapid progress of the PC. Personal computers gave library managers the possibility of developing systems that were cheaper and easier to learn and use than mainframe or minicomputer-based systems, and eventually to do things that had been possible only on larger systems. This was particularly important as it became necessary to meet greater patron demands with reduced financial and personnel resources. Basic bibliographic and housekeeping functions were supplemented by word processing, financial management, decision-support software, access to distant databases, etc.

Introduction of personal computers also meant being able to meet the needs of an increasingly computer-literate public, whose expectations from libraries were to some extent shaped by their experiences with computers. Computers have become an integral part of the school curriculum, so that an ever-growing percentage of adult library patrons take readily to public-access computer services and do not require elaborate training in their use.

The advance of data communications capabilities meant that a local personal-computer based system need not be cut off from the rest of the world, but could participate in online data retrieval, electronic mail, conferencing, etc., or interact with a mainframe in terminal emulation mode.

In Israel, public libraries have lagged behind the university libraries in the area of automation. This is a natural consequence of the fact that, in general, their collections and the demands on their resources are less than those of the academic libraries, on whom they frequently rely for support and backup. Thus, while the decade of the 1980s saw the evolution of a minicomputer-based system accepted as standard by all the Israeli universities, it is only in recent years that viable systems for public libraries have been introduced. Once such systems entered the market, and one in particular received approval and backing from the Center for Public Libraries, progress was swift. This article will summarize how the PC has come to be an influential factor in Israeli public libraries.

2. Background: Automation of Academic Libraries

Automation of the country's academic libraries, which began in the mid-1970s, is characterized primarily by ALEPH, a VAX-based system developed during the 1980s at the Hebrew University and which has been installed at all the Israeli universities. Presently, ALEPH includes cataloging, online public access catalog, authority control, circulation and serials control, with the acquisitions module nearing the final stages of development. It supports both Latin and Hebrew script, with Arabic available when working on a PC with a special graphics card (see below).

The University of Haifa Library has been active in developing its own systems. Some of these were replaced by ALEPH, but others (circulation, acquisitions, bibliographic projects) have been retained, either because there was no suitable ALEPH module or from management considerations. There is a rudimentary inter-university network, whose functioning is impaired by Israel's dated and overloaded telecommunication lines.

The topic of library automation in Israel is covered in greater detail by Adler (1983, 1985, 1986-7) and Sever (1983).

3. The Situation in Public Libraries

While the pioneering work in library automation was based in the universities, public librarians were very interested in obtaining computer assistance. Israeli public libraries generally employ a very small number of professionals - perhaps two or three in each shift - who must often handle a significant portion of the clerical work in addition to their regular duties. In hopes of obtaining some release from clerical chores, librarians expressed a desire for automation; however, the majority realized the inadvisability of developing their own systems, and there was no justification for introducing the powerful and expensive ALEPH, which was suitable for only the largest public libraries (such as Tel-Aviv).

This was a market crying for products, and in the mid-1980s, the hoped-for products began to appear.

There was also a need for overall coordination and initiative. This came from the Center for Public Libraries, established in the 1960s to provide services to public libraries. Since 1966, the Center has produced catalog cards, in Hebrew and Arabic, for books currently published in Israel, bringing about standardization of catalogs in the public libraries. During the 1980s, the Center cooperated with the University of Haifa Library in several computer-based projects, including publishing of the Library's Index to Hebrew Periodicals and the entry into computer of the Center's collection of cataloging data for books published in Israel since 1948.

The Center's background in providing cataloging services and its prior experience in computer projects suited it to play a role in the diffusion of automation in public libraries.

4. LMS+

The system prevailing in public and special libraries is a commercial package from TOP Systems in Tel-Aviv, called at one time "Sifria 83" ("Library 83") but now marketed as LMS+.

This package was developed to take advantage of the advent of the PC as an economically feasible means of automating small and medium-sized libraries, in light of the poor funding Israeli public libraries receive. Input was sought from various groups active in the field in order to fashion a system that answered the needs of the public-library sector. Design of the software had the following principles in mind:

1. modularity - various library functions can be automated in stages, according to the user's needs and budget
2. user-friendliness - use of menus and detailed data-input screens
3. flexibility in allowing individual institutions to tailor the cataloging formats to meet their needs
4. bilingual capability (Hebrew and Latin scripts)
5. keeping the cost - including hardware - to less than $20,000 per installation

The resulting package was installed at several test sites in 1983 and 1984. It met with wide approval, and, following a public tender, was adopted by the Center for Public Libraries as the officially recommended system, as described below. Cooperation and consultation among TOP systems, the Center for Public Libraries and the University of Haifa Library have contributed to the continued development and distribution of the software, whose 2nd edition was released in May 1989. According to the vendor, LMS+ has been installed in hundreds of libraries, information centers and archives, both in Israel and abroad, including 50 or more Israeli public libraries.

5. Adoption of an Automation Standard

In 1987 a Steering Committee for the Automation of Israeli Public Libraries was established, comprising representatives of the Center for Public Libraries, the Ministry of Education's Library Division, the Company for Automation of Local Administrations and senior librarians from around the country. (The Company for Automation is a government body responsible for providing computer services to Israel's local authorities.)

This committee drew up a specification for an automated library system for Israeli public libraries and presented its report, with conclusions and recommendations, in early 1988. The report stated, "it is recommended to purchase the TOP software, which is more comprehensive and better developed than" the alternative library management packages examined by the Committee, and would be a good solution for large municipal libraries. ("Large" is a relative term, since, except for Tel Aviv, no municipal library has holdings of more than 100,000 titles.)

Following an agreement signed between TOP Systems and the Company for Automation in 1988, the latter organization began distributing LMS+ to public libraries. The system was also installed at the Center for Public Libraries, and was applied to the Center's projects for cataloging and for providing uniform catalog cards to the nation's public libraries.

At this time, a comprehensive conversion project was undertaken. Because the University of Haifa Library had previously entered into its minicomputer nearly all cataloging records prepared by the Center for Public Libraries for Hebrew titles published since 1948, a comprehensive database was already available. In 1987 the University of Haifa Library recommended that the Center, which until then had used the Library's computer facilities and expertise, become independently automated. This conversion project was undertaken in 1988, and by September of that year the Center was able to begin distributing cataloging records on diskette to public libraries, for import into LMS+ systems. Participating libraries may request the records needed for the items in their collections.

Thus, the Center was able to become the hub of a quasi-network based on PCs, with independent housekeeping for each library, along with the option of downloading cataloging records from the central database. This circumvents the poor telephone communications lines, a factor long impeding the growth of networking in Israel, and paves the way for union catalogs, shared cataloging and full-scale networking.

n development is an LMS+ module for automating audio-visual collections. This would affect not only regular libraries, but special Israeli institutions known as Pedagogical Centers. These Centers belong to the Ministry of Education and are, in effect, lending libraries for audio-visual material and curriculum packages, utilized by teachers and schools. There are Centers in all major towns and are Israel's answer to the problem of providing audio-visual resources to classrooms when financial constraints make it impossible to set up media centers in each school.

Recognition of the need for automating public libraries came from the field; however, the initiative and the solutions came, as has happened more than once in the history of Israeli libraries, from bodies outside the libraries themselves.

6. ALEPH-PC

The other major contender in the small-library systems market is a trimmed-down version of ALEPH, able to run on XT, AT and PS/2 personal computers (and compatibles) equipped with hard disks. It was developed to meet the needs of small and medium-sized libraries, and can support a multi-user network. It is used as a tool for bibliographic organization and information retrieval by private collections, researchers, special libraries, rabbinical seminaries and some special collections in the Jewish National and University Library. At present, it does not support all functions of the VAX-based ALEPH. The most important differences are:

1. Since the PC version does not include network functions, there is no direct access to MARC or any other bibliographic database. However, MARC records downloaded by other means can be "imported" into the ALEPH database.

2. There is a full periodicals catalog, but no automatic checkin facility for keeping track of receipt of items, items sent to the bindery, etc., and generation of dealer reminders
3. Purchase orders may be input, but not as part of the integrated database, as will be the case in the full-scale ALEPH when the acquisitions module is completed. There is no budget accounting.
4. Similarly, circulation and holds data may be input as separate records rather than as elements of the integrated database.

Planned developments include stand-alone bibliographic work stations that would provide, by means of hard disks, broad access to bibliographic tools such as the Index to Hebrew Periodicals, the Union List of Serials and the Index of Articles on Jewish Studies. Hard disks would be the favored medium rather than CD-ROM because the small local market for the product would not justify the investment in equipment needed in order to produce the optical disks. Should future development of the technology or a larger market lead to reduced costs, there may be grounds for reconsidering CD-ROM as a distribution medium.

An additional ALEPH-based use for microcomputers is as intelligent terminals interacting with the large ALEPH system by means of appropriate communications and terminal-emulation software. The software includes the option for working in Arabic; but the PC requires a graphics card in order to accurately produce the extended character set of some 50 characters.

Summary and Outlook

In Israel, as in the rest of the world, libraries and librarians are being influenced by the diffusion of personal computers. The pace of progress - both technological and cultural - is so swift that the ultimate impact cannot be foreseen. Broad trends, however, can be discerned. The development of viable personal-computer based systems, such as LMS+ and the PC version of ALEPH, have given great impetus to the acceptance and diffusion of automation in Israeli libraries. Public libraries, in particular, have benefited from the "adoption" of the LMS+ software by the Center for Public Libraries, and a quasi-network based on a central cataloging database and common software is in the formative stages. The role of the Center for Public Libraries reflects the tendency in Israeli librarianship for significant developments to be motivated by forces outside the libraries themselves.

Looking toward the future, one hopes that improvement in the Israeli data communications infrastructure will remove a major stumbling block and that full-scale networking will become a reality. The model of inexpensive local housekeeping coupled with the possibility of avoiding poor or expensive telecommunications lines may be appropriate for countries with similar problems.

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Integration of Microcomputers into a Mainframe Based Library System

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Abstract

The integration of microcomputers into a mainframe based local library system does not only involve the technical questions of networking and its support by appropriate LAN operating systems. The development of computing on the university campus and the relation between the university library and a great number of research institute libraries to be connected set the limits for microcomputers in a local library system with the improvement of library services in mind.

The present situation of the Heidelberg university library system will be shown, where HEIDI, a DOBIS derivative, is in use since the late 1970s. The application of microcomputer based library software in the university institute libraries brings about organizational as well as technical questions that will be discussed in the paper.

To give access to the local holdings of both the university library and the institute libraries needs to make decisions over the quality and format of catalogue data and the update procedures necessary. Help and support have to be supplied by the university library and are considered to be based upon a training course service both in cataloguing rules and their application in computer aided cataloguing as well as basic technical support for the software used.

Integration of Microcomputers into a Mainframe Based Library System

Introduction

Heidelberg local library system (1) consists of the total number of institute and departmental libraries belonging to the University of Heidelberg and their holdings plus those libraries in town which are linked by their own decision to participate in the local library systems services. The former libraries are the main university library with its one branch, and a total number of approximately 150 libraries in university faculties and research institutes. The latter are represented e.g. by the library of the teachers college which is independent of the university, other independent research institutions such as Max Planck Institutes for Comparative Public Law and International Law and for Medical Research, the European Center of Molecular Biology and the German Cancer Research Center, to only mention a few, last not least the Heidelberg public library.

Present Situation of the Heidelberg University Library System

At present, the holdings of the local library system are listed in the catalogues of the university library and a catalogue with the holdings of all the other libraries mentioned (2). These catalogues are card catalogues. Since 1986 all aquisitions of the university library are entered into the regional cataloguing network in Constance, and the data are then retransferred into the local online library information system. Furthermore, some of the mentioned institute libraries and other research libraries are linked online to this local system, so that a growing number of holdings is presented to the patrons via an online database and an OPAC interface. From 1989 on onwards we additionally provide the holdings of the Karlsruhe County Library and the Library of the Karlsruhe Technical University as well as the holdings of the Mannheim University Library in this online system, as they are entered into the regional network in Constance. Altogether, the Heidelberg online database resembles a mighty tool to access the holdings of the region within a radius of approximately 50 km or at longest 40 min. by train or car (fig.1).

Geographical Situation

The geographical situation in Heidelberg (fig.2) made it difficult to create a university campus. The old university with its buildings was spread all over the center of the town and the main building of the university library is situated in the old town as well. The medical center forms a separate block of university buildings somewhat outside from the town center, but still on the southern banks of the river Neckar, whereas most of the new built institutes reside on a campus on the northern banks of the river. This campus was established in the 1960s and building there is still in progress. The branch of the university library shares estate on that campus and the universities computer center has its building there. Thus, the total holdings are spread all over the town, what makes delivery services by car necessary. Moreover, to provide access to the holdings makes the use of an online based circulation system an essential demand.

What HEIDI Is and Where It Resides

The local online library information system is HEIDI (3), a DOBIS derivative which is in use since the late 1970s. DOBIS HEIDI is not supported by IBM, since it is based on the original Dortmund version of the software. All further development was done by library staff in Heidelberg (4). The system is used for circulation, which was the first application needed, and cataloguing so far, the acquisitions module is not in use yet. The catalogue module has some extensions providing a documentation database to research institutes interested in this service. Because the university library does all her cataloguing online into the south west regional network in Constance, the input via HEIDI catalogue is not used by the university library. Data are retransferred from Constance to Heidelberg to provide the online user access catalogue and the linking of holdings and circulation services.

Cataloguing with HEIDI is however used by some institute libraries in town, but the trend to PC based systems in these libraries is much more stronger.

HEIDI resides on a computer which belongs to the university library but it is installed in the university computer center. The library machine, an IBM 4381 P02, is linked to the far bigger machine of the university computer center, an IBM 3091 D, providing access to HEIDI from every terminal or PC with terminal emulation which is connected to the computer center using the university network. This is the key for the connectivity of HEIDI to the institute libraries of the Heidelberg local library system mentioned above. At present approximately 130 terminals located in more than 30 research departments use HEIDI services. This linkage also provides an access from home using communications software and modem.

Connectivity

Heidelberg University uses its own network based on hired PTT lines in town to provide the connections to the three main university sites. There will be a shift towards a high speed optical fibre network, but this is not yet ready. A library of the university or another institution in town needs a connection to this university network to take full advantage of HEIDI services and sharing of bibliographical records. With some restrictions, small libraries could use an unconnected PC based library system and share their data via diskette exchange, until networking is provided for their buildings.

Quality and Format of Bibliographic Data

Besides the basic technical requirements to use PCs in a library system, the main decisions must be made in choosing an appropriate software product. For the next few years to come these decisions are based on the following demands:

1. **Standardized catalogue format** - Librarians in the local library system should only learn one catalogue format.

   Within a project of the German Library Institute (DBI in Berlin) and granted by the Ministry of Education and Sciences of the FRG (5), demands for cataloguing with PCs have been worked out and published (6) (7), presenting not only a shell for a user interface, but a minute system providing the input of bibliographic records according to the cataloguing rules and compatibility to other bibliographic databases, above all the regional bibliographic networks.

   Standardization of cataloguing formats, i.e. the presentation of fields for data to be entered on screen, has more than just one advantage. Besides the fact that a defined concordance between the field tags on screen and thus the part of the user interface for cataloguing and the fields used for transferring data from one system to another provides clear outlines for the vendor to establish the demanded functions which provide cataloguing according to the German rules (RAK), there is also only one user interface to be considered by the librarian, regardless what vendor has been choosen. From the viewpoint of the central library, which runs the local library system, a standard cataloguing format has the evident advantage of only one system to be trained. Training of cataloguing rules can thus be provided according to the application in an online library system in mind, the ways to deal with using the appropriate fields for the input of data for a certain example of library media to be entered can be trained on just one system, the others in use have to be dealt with in exactly the same manner. There may be differences in the power of the products to be considered, which is the chance for vendors to offer library automization for libraries with different requirements. The main library has to establish a service which supports the installation of the systems on campus and the first steps in running it.

Standardization of cataloguing formats requires the concept for an appropriate database structure. This is mainly up to the vendor, for he must consider also other modules than the catalogue which he may want to serve from this one database. He has to consider the requirement for supporting authority control for names and corporate bodies and the hierarchical linking of records, e.g. between series title main entry and the parts main entries. This is a demand of nationwide compatibility of bibliographic databases in libraries.

Authority control with links between bibliographic records and authority records has some evident advantages. The first is comfort and security, that is, updating the authority record will update the linked bibliographic records as well. The database consistency as regarded to crucial retrieval entries like e.g. author names and corporate bodies is easily maintained. Secondly, authority files obtained from the main library enhances the usage of the correct entries even in small libraries, where no professional librarian is on duty. This will enhance the quality of the records. Thirdly, updating the host with the holdings of a library within the local library system will only make record editing necessary, if the host does not contain an authority item required yet.

The disadvantages are given by the fact, that every library system will remember links between records by referring to its own record identifiers. To make an upgrade in every direction possible requires authority files obtained from the host and containing the record numbers of the host system with every record. These files have to be imported before the library starts the input of bibliographic records or authority records have to be downloaded on the job. The database structure of the PC based systems must contain fields for host record identifiers thus providing an unique match for updates. For there will be at least two hosts to be considered in Heidelberg, the local system HEIDI and the southwest regional bibliographic tool in Constance, this would require the download of authorities from the latter system to the local host first and then to the dedicated library databases.

Even if one takes into account, that storage media prices are dropping, these host authority files have to be reduced to fit on the hard disks of the PCs. Statistical data of the links between authority records and bibliographic records on the host database can give some ideas for filtering, but some research has to be done in this field.

Another way to solve this problem is the development of match code routines, which can identify records while importing with the content of the database, but this is by no means an easy approach.

Anyway, while importing, a protocol printout should be produced showing those records which could not be linked to appropriate authority records, so that later editing is made easier.

2. Standardized Exchange Format for Data

A standard exchange format for data must fit in the present situation of our local library systems, where networking to the host is not always the case. A diskette network must be provided as well. Thus the situation can be simplified to file transfer for the next years to come, which requires import routines at the hosts interface. To provide the highest flexibility in using different PC based library software a standard exchange format is necessary, regardless what PC based systems are in use. With the help of a standard data exchange format the host has to develop this interface only once. MAB Diskette as an exchange format is under development by the Deutsche Bibliothek in Frankfurt. We will use this format in Heidelberg and establish an import interface in HEIDI. The problems and possible solutions for upgrading the host in the local library system will be discussed later.

3. Using Other Databases as Bibliographic Tools (HEIDI = Local Data, DB, BNB, LC = CIP and Bibliographic Services, SWB = Regional Data)

Not every library in the local library system is run by a professional librarian, a lot of small libraries have nonprofessional trained staff. It is evident, that sharing of bibliographical data would increase productivity and reduce false entries. Besides using the online database of the local library system, which is HEIDI in Heidelberg, services provided by the regional bibliographic tools would have additional advantages. Offline services could be developed as ISBN indexes or short title indexes offered on disks, with file transfer or diskette exchange services for the delivering of records (the southwest regional network system in Constance will offer services like that), online services would be direct retrieval and download of records.

4. Flexible Import/Export Interfaces to Provide an Automated Data Exchange

The user, i.e. the librarian should not take care of different batch jobs to run an export of his data to be transferred to the host, he should simply evoke a function providing this. The option export or import respectively uses default settings, which can be set up by the staff of the main library. The default contains the filename information, which may identify the library for the host. It also contains the parameters to be used to get an export file for updating the host, or a text file to use in a word processor, e.g. to produce inhouse informations about new holdings. The most important function is the ability to export data which were added to the database in a certain time interval. This should be set up in the defaults, but it must be possible to override it. So the librarian will evoke this export function on his system, he will be prompted for the default settings, he may choose other settings from a list, e.g. export for catalogue cards, for lists, etc., than normally the system exports all data which have been entered since the last export of the like.

The next steps can be easily done using batch files. They consist mainly in sending the file to the host - or manually putting the diskette in an envelope to send it to the main library.

Import routines for records from bibliographic tools should also be provided by this comfortable interface.

5. **If Other Services Like Acquisitions and Serials Control are Supported, Fund Management According to the Administrative Rules in Our Country Must Be Provided.** (8)(9)(10)

Upgrading the Host

A member of the Heidelberg local library system will enter bibliographic records in his micro based system by using bibliographic tools first. If a connection to the host is present, the work to be done will be divided by organizing the download of necessary information. This is done via a 3270 emulation session, the usage of ISBN or short title indexes and the download of these data. The downloaded file is then processed for import into the PC library system. Authority records are matched by the help of the field which contains the hosts authority record identifier, and hierarchical links are obtained in the same way. If no match is found, the printed protocol shows which records have to be edited to make appropriate links possible.

If this retrieval session fails, the titles are entered into the libraries own PC system, using the authority records which can be found in the hosts authority database or at last entered by the librarian himself. Weekly exports are made, sent to the host and imported into HEIDI database. If the authorities do not match with HEIDIs authorities, records are edited by the staff of the main libraries local library system department. If the authority record of the institute library cannot be accepted, the librarian is informed to edit the appropriate record and to enter the hosts identifier.

Services and Support Provided by the Main Library

The university library itself has a special department which runs the local library system and takes care of the bibliographical data for the holdings of all connected libraries.

In the past, this department had to edit and run the card catalogue, now everything is moving towards our online services. Editing and supervising of the local systems database, the HEIDI bibliographic database of Heidelberg holdings, is provided by the staff of this department. The consistency of the HEIDI database is obtained by editing and controlling mistakes. If some are located, the connected library is asked to correct its records.

Furthermore, the local library system department is offering training courses for library staff of the university and other connected libraries, the colleages are trained in application of cataloguing rules with library systems. There are mainly two steps or classes: Beginners and nonprofessional librarians, as well as professionals.

Technical support for the PCs in the library system and the software will be maintained by staff of this department, too. This requires at least one installation of every used system. The training in running the systems is complemented by a short overview to demonstrate the advantages the systems will cover, if a library has to decide between more alternatives.

Conclusion

It must be pointed out that Heidelberg University Library will allow every system to be used in the local library system which fits the specifications mentioned above. Why do we not force the use of only one PC based library system? Maintenance would probably be more effective and easier.

We don't believe that this will come out. Requirements for a library system running on microcomputers differ widely and depend on the size of the library, the motivation of the librarian there, and the special demands of the researchers in this particular institute to outline the library services which are asked for.

To store bibliographic data and holdings and make those accessible from whatever point in the local system is only one but a very important view. The librarian in the institute library may ask for a lot of more support of his work. Depending on the subjects the institute covers in research, serials may be the main source for information in this field. So very often the librarian asks for a support of serials control and a flexible tool for indexing papers to build up an inhouse documentation database.

On the other hand, vendors should be encouraged to cooperate with librarians to develop library software on the base of the main specifications mentioned above, which cover a variety in functions, modules, and library sizes. The microcomputer marketplace shows rapid changes towards new and exciting technologies for mass storage devices and other hardware components or LAN solutions, so that our library systems software of today should be engineered to follow these developments.

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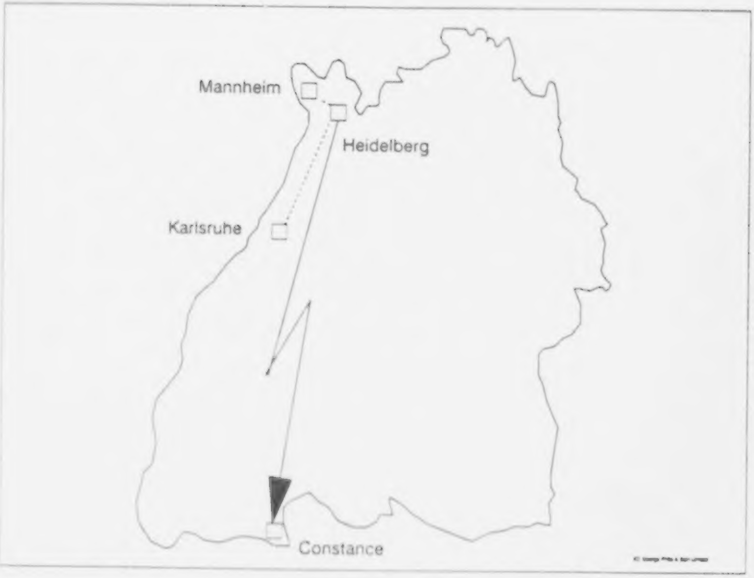
Mannheim
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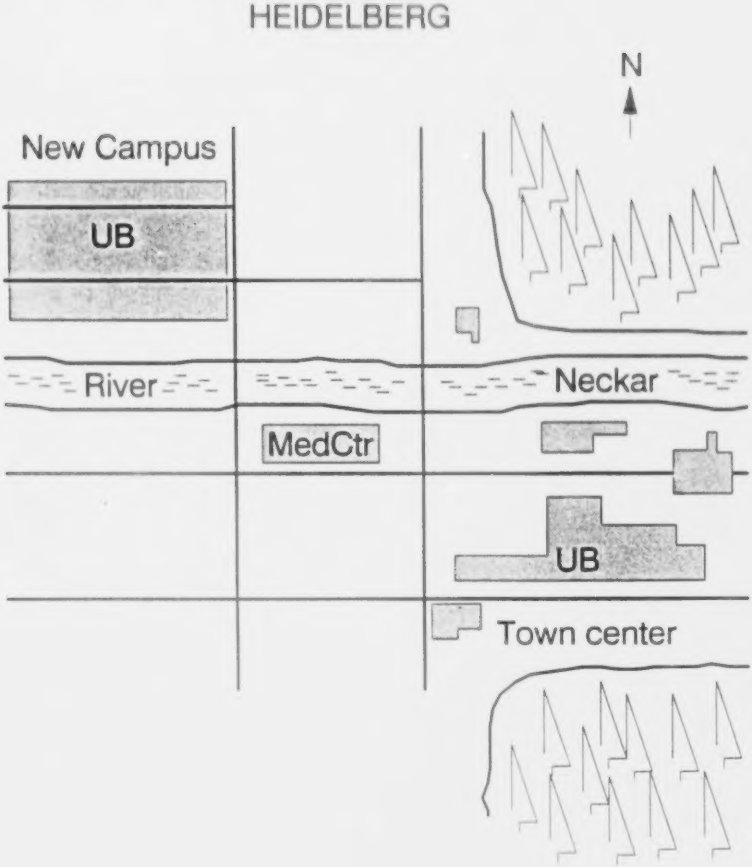
Karlsruhe
Constance

Figure 1: Heidelberg local library system connected to the south west regional network in Constance. Note the library triangle in the north of the county.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MedCtr
UB
Town center

Figure 2: Map of Heidelberg with university sites indicated.
UB = University Library and branch

Allegro
A New Database Concept for Micros (MS-DOS and UNIX)

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Abstract

From early beginnings in 1980, using 8-bit micros, "allegro" has been under development and in practical use at Braunschweig Technical University. Turning to MS-DOS in 1985, all programming has since been done in the language C to achieve maximum portability. Test site for the UNIX version is Herzog August Bibliothek in Wolfenbüttel, employing a Siemens MX-500 machine under Version V.

"allegro", as it stands now, consists of

- database kernel using advanced B*-tree indexing; features user configurable record structure and index definition, fully real-time index management; unique user interface for quick searching with minimum of keystrokes;
- additional full-text search program with Boolean logic; this does double duty as export program;
- editor for variable length records, both full-screen and command-driven
- fully parameterized, user-programmable import program that handles all known file structures, including MARC formats, downloads, CD-ROM data, ect.
- parameter-driven export module, included in every program; a wide range of data manipulation functions can be used to generate every kind of output from catalog cards and screen images to index entries;
- auxiliary programs for database management tasks.

General features of “allegro“ are

- maximum flexibility in record and index design (including multiple fields, subfields, repeatability within fields, hierarchical relations);
- “merged heading index“ option (keywords, names, titles, subject headings, series titles, ect., all in one alphanumerical sequence) results in “one-stop searching“ and eliminates conventional search commands;
- dynamic space management and index compression technique allow for optimum use of disk space;
- powerful output production language;
- accessibility of menu texts: especially; foreign language interfaces can be designed by the user; an English version is available;
- multi-user capability running on all kinds of PC networks;
- all functions extensively documented (in German).

Over 100 users have already built many kinds of databases. On the C programming level, users can even add their own routines: an easy-to-use software interface opens up the database kernel to the inclusion of new functions.

Allegro
A New Database Concept for Micros (MS-DOS and UNIX)

Albert Einstein used to urge colleagues who came up with laborious explications of new theories, "If you cannot say it in one sentence, it's too complicated". Well, if we all achieved that goal, at Essen Symposia for example, there would be a lot more time for receptions. In the real world, however, we can only hope to express ourselves with relative brevity. Let me therefore try to satisfy Einstein first and your appetite for deeper insights afterwards.

In a sentence: "allegro" is a way to deal with variability. Too broad? A somewhat longer sentence might be this: "allegro" is data handling and file management for the access and care of variable length records that contain a variable number of repeatable, variably structured fields of variable length.

These statements contain no reference to bibliographic data, and indeed, "allegro" is not expressly geared towards those, but it is rather a generalized data management software, and it is indeed being used in various applications outside the bibliographic world.

Now, what does it mean, "to deal with"? It includes 8 things:

- **define structures** (tag list, prompting, hierarchies)
- **enter new records** (thereby using elements of already existing records; automatic indexing immediately after entry)
- **edit existing records** (with real-time index management)
- **store data** (waste-free storage, dynamic space management)
- **retrieve data** (both indexed access and string search)
- **manipulate data** (reformatting, all kinds of "export")
- **load data** from outside sources ("import" foreign formats)
- **link data** (add other applications to a database)

Now, with these 8 things in mind, let us first look, from a distance, at the "Universe of Data".

As illustrated in Fig.1, detailed spectroscopic analysis of data sources in this universe has shown that almost all emissions fall into only 4 categories:

- **fixed length** records with fields of fixed lengths at fixed positions (class name: "dBASE DBF")
- records with a **fixed number of fields,** each of variable length, usually not tagged (class name: "dBASE ASCII")
- variable records with **tagged fields** (class name: "MEDLARS")
- records with a **directory,** mostly conforming to ISO 2709 (class name: "MARC")

"allegro" has something like a telescope that can be fine-tuned to receive the whole range of emissions from all these sources and analyse their spectra into all components. This instrument is called the "import language". It serves as the means to translate foreign structures into something the "allegro galaxy" can accomodate, i.e. into an "allegro" internal format. This type of format is a subtype of the MEDLARS class.

For the reverse purpose, there is a device called the "export language". For communication with the outside world, it can emit "allegro" data in formats that other galaxies can understand. It does a lot more than just produce records in arbitrary formats. It also produces cards, sorted lists, catalogs with alphabetic indexes, labels, reports, and even access elements for the rapid access module. All of these are products that are derived from internal objects. And all this communication is done in one and the same language - the export language. It is not an easy language, yet only this language needs to be mastered to be able to produce everything one wants to derive from a database.

Approaching the core of the "allegro galaxy", we find it to consist of a number of programs rather than of one monolithic block (see Fig.2). Characteristically, all programs contain the export module and the editor but otherwise serve different purposes:

PRESTO	rapid access by all kinds of index terms record entry and editing: there is quick and easy access by user-definable keys like title keywords, titles, names, places, call numbers, subject terms or even the familiar OCLC search keys. Access is via a very convenient browsing list with fully interactive, real-time update.

Capacity: up to 30.000 records (index included!) per 10 MB of disk space. There is Boolean logic to combine results and one-keystroke formatted export of result sets. Another keystroke accomplishes arbitrarily complex search-and-replace commands on any result set - the index being updated on the fly along with the data.

SRCH	full text string search with Boolean logic, plus export
IMPORT	record conversion (see below)
INDEX	database generation and loading of new files
UPDATE	1. playback after crash; 2. automatic record replacement; 3. duplication check
ALLEGRO	"offline" editing of basic files (non-indexed files)
ASORT	alphanumerical sort of variable files

These programs can be called directly from DOS level by their names, and they can also be embedded into batch files and called from there with all options supplied by the batch programmer. An example of such a call is this:

```
SRCH -f4 -kp -e p2/list -d bibl -m0 -v0
```

This command calls SRCH to run with configuration P.CFG (option -kp), to do a full-text search (option -f4) on files located on directory BIBL (option -d bibl) and produce export data using parameter set P2 to generate a file named LIST (option -e p2/list). Manual intervention and visual display of results are not required (options -m0 and -v0, resp.).

Let us focus on just two of these programs: PRESTO and IMPORT.

PRESTO

The Control Panel

PRESTO confronts its user with two different kinds of display: the record display and the index display.

This is an index display example:

```
1 bingel, irma
1 = = > biochemie SEE ALSO - > chemie
1 biochemiker
2 biochemistry
```

```
1 biochemistry x) tables*
1 biochemistry*
1 bioethics z) great britain x) congresses*
1 bioethics z) united states x) congresses*
1 biogas
1 biogas*
1 biogasanlage
1 biogasanlage*
1 biogaz
1 biogenesis
2 biograph
1 biographie
3 biographie*
1 biolinguistics*
↵  = access               BACKSPACE = clear result set
↓/↑ = browse down/up      F1 = HELP              F6 other term
←  = title display        F2 = print             F7 = expand
→  = follow reference                            F8 = EXIT
+ / — = AND OR NOT
Esc+x = save phrase       F5 = previous record   F10 = truncate
%* = toggle freq counts / display freq truncator = ' '
```

As readily apparent from this example, the index is a "merged headings index" that has names, title keywords, subject headings and authority entries of all kinds (if desired) in one alphabetical sequence. The result is "one-stop searching" and it eliminates the need for a search language.

Moving the cursor down to "biogas" and then using "cursor left", we get this example of a record display:

Record Display Example

```
Datenbank: NMN Datei#: 1 Satz#: 518          Laenge: 404, frei: 4
Deutsches Zentrum für Entwicklungstechnologien <Eschborn>
Status report energy from biogas : anaerobic fermentation; a publ.
of Dt. Zentrum für Entwicklungstechnologien - GATE in: Dt. Ges.
für Techn. Zusammenarb. (GTZ) GmbH / Deutsches Zentrum für
Entwicklungstechnologien <Eschborn>. - Braunschweig; Wies-
baden: Vieweg, 1986. - 36 S. : graph. Darst.
ISBN 3-528-02028-8
```

```
        >>>biogas
↵   = express access       input file# : 1          (change: F)
↓/↑ = browse forw/backw    F1 = HELP                F6 = Index
E   = edit current record  F2 = print menu          F7 = keys
I/C = input / copy         F3 = formatted display   F8 = EXIT
Del = delete curr. rec.    F4 = export              F9 = language
nvdu+- = browse (Ctrl+F1)  F5 = toggle disp.mode    F10 = glob.corr
```

From here, we get back to the index using "cursor right" (or F6). Or, we can also browse up and down in the sequence given by the index, but directly through the record space, using "cursor up" and "cursor down".

To turn up a different "page" in the index, you just type in the first few letters of a term you have in mind and press "Enter" - in less than a second the appropriate part of the index comes up, the arrow pointing at the closest term that matches your input. Thus you always get something; answers like "no hit" are never encountered.

The above examples make it evident that the basic control panel consists of just the four cursor control keys and the alphanumeric keys. Their use follows a very intuitive analogy - the reference book analogy (Fig.3): turn a reference book to the right to browse in the index, to the left to look something up in the reference sections.

This analogy and the whole browsing process are understood very quickly, and the simplicity of the basic control panel makes PRESTO an attractive OPAC interface. It is being used as such already in several institutions and has gained much popularity.

Some of the other functions that are indicated on the index and display menus are the following:

Index Menu

+/- Boolean combinations: point the arrow to term X, press '+', then browse anywhere else, point the arrow to term Y and press '+' again: the program will AND X and Y together and display the number of results in the lower right. You may AND or OR further results into the result set by the same method. From the display menu, then, you can browse the result set using 'd' and 'u' for "down" and "up".

BACKSPACE clears the result set and makes room for a new one.

F10 turns up the question, "position?"
your answer can be

- a number: all index entries are truncated to this number of characters, entries matching up to this character are summed up. This is called "fixed truncation".
- a character: this is called "variable truncation". Say the character is the comma. All personal names will then be truncated behind the comma, and consequently all Millers and Bakers etc. will fall on one line, their frequencies all summed up! With series entries, use ';' as a truncator, and all pieces of a series fall onto one line and you see the number of volumes contained in the collection.

Ins
Del Instant index management is possible to add or delete arbitrary entries

Enter if the arrow points at a reference (a line that contains "—>"), use of the Enter key at once turns the index to the entry that is behind the "—>" ("chemie" in the above example). Such references are produced automatically from authority records but can also be inserted into the index manually using "Ins".

Display Menu

E Edit the current record: provided the user has that privilege, he/she can now edit the current record and then save it using F10. All necessary index management will be done in real-time: returning to the index after any editing, the user will see the results.

C Copy current record: based on an existing record, the user can construct a new one and save it using F10.

I Input: working through a prompt list, the user enters a new record field by field. The prompt list can contain jumps and branches and accomodate several record types.

F2 a print menu comes up; among other functions, the output of card sequences (unit cards with all headings) can be produced from here.

F4 Export: the current record or result set can be output to a file using a specified format (i.e. a specified set of parameters)

F5	toggle between formatted and tagged displays
F6	go back to index (same as "cursor right")
F7	show all index entries belonging to current record
F8	EXIT program
F9	change language : ENG for English, GER for German ...
F10	global correction : any number of changes on any number of records can be made automatically. The changes must be defined prior to the use of this function by a special command given in the editor. All index corrections relating to the changes are made automatically. This is also an alternative to full authority control: one command can correct all related records!
TAB	external function: on the language C level, a user exit exists that makes it possible to add new functions without intervention in the source codes. A small source module that can be disclosed to users contains this user exit, and everybody with an in-depth knowledge of C can write additional routines to manipulate the current record.

The idea behind the concept of "external functions" is to open up "allegro" as widely as possible for database projects of all kinds. This should apply not only to the levels of configuration/parametrization and batch programming, but also to the C level. There are already colleagues at two libraries experimenting with the latter. The C programmer can access and manipulate all elements of a record and use all functions related to retrieval and storage of records and index entries, plus the powerful export module to derive a wide range of secondary structures from records without C coding. The powerful function concept of C makes it possible that the programmer doesn't need to know anything about the vast body of code that constitutes the "allegro" core - she/he uses it like a black box.

The combined power of all these possibilities almost confronts the end-user with, as Mark Twain would have it, "insurmountable opportunities". Complete and systematic documentation is, of course, a prerequisite. An up-to-date manual was just issued in conjunction with the latest version, numbered "9.7". It is a systems manual, not a textbook. It must be admitted that there is growing demand for the latter, yet nobody has yet undertaken to write one.

Import

The advent of CD-ROM has greatly increased the number of potential sources. It has also exacerbated the quest for efficient means of data conversion since any two CD-ROM data formats are likely to be different. In most cases, the task of converting data from one format to another using conventional programming (in PASCAL, COBOL, BASIC, C or whatever) is prohibitively labor-intensive, especially if it is an ad-hoc or one-time job. If such a program was indeed written and has been used for a while, the second problem is its serviceability. In most cases, changes in the data source or the way one wants certain fields to be handled will require program changes. With conventional languages, this can become a headache, much more so if the programmer who originally did the job is no longer available.

The "allegro" approach is a purpose-designed, high-level language, that almost eliminates the need to use the conventional languages.

The "import language" has certain features of a real programming language: loops, jumps and conditional branches. It has a range of commands that operate on four levels: character, field, record, and file.

In more detail, the commands comprise the following:

Levels of Action

File
- find first record
- detect end-of-file

Character
- conversion table (e.g., EBCDIC → ASCII)
- converting two-character combinations

Record
- detect record type and react accordingly
- specify delimiters (file type)
- global character string replacements
- selection
- hierarchy detection and handling

Field

- identification
- reaction on presence/absence

- preprocessing; incomplete list of functions:
  - remove line breaking and unwanted spaces, delimiters, etc.
  - tag
  - cut (subfields etc.)
  - paste, concatenate, merge imported strings and user-supplied text elements
  - string replacement within field
  - table driven translation (e.g., country codes)
  - article check
  - multiple field handling
  - jumps (conditional and unconditional)
  - subroutines (e.g., ISBN hyphenation)
  - order fields by tag

Data conversion in "allegro" is actually a two-stage process. The "import language" achieves the first step only, namely the conversion of foreign stuff into an "allegro" internal format (described in the underlying configuration file). The second stage is an export process carried out by the export module that is also part of the other programs. That implies two things: first, any function the import language carries out might be performed in the second step by the export language; second, any export specification that was designed for conversion of some "allegro" format into something else can be combined with any import specification that converts a foreign source into the same internal format. Thus, to be able to convert any of N formats into any of the remaining N-1 formats, 2*N specifications need to be written (N for import, N for export) instead of the theoretical N*(N-1) conventional programs. With N=10, this means 20 against 90. In principle, the philosophy behind this is the same that led to the development of the OSI protocols: instead of writing bilateral procedures for any two end-user systems, design a common language that all must be able to speak and understand. Without this approach, data communication would already be unmanageable.

Export

The "export language", to complete the picture, consists of 5 levels and contains these features:

Character level

- conversion table (e. g., ASCII → EBCDIC)
- handling of dual combinations

- elimination
- replace character by string (e.g., ESC sequence)

Record level

- conditional output (several per record)
- specify delimiters, record header and footer
- replacements
- hierarchy handling

Field level

- arbitrary order of output
- reaction on presence/absence
- preprocessing
  - cut (subfields etc.)
  - paste, concatenate fields and other elements
  - replacement within field
  - article removal
  - compare field with fixed/variable strings
  - jumps (conditional and unconditional)
  - subroutines (user definable)
- multiple field handling
- user variables, e.g., to keep things for subsequent records
- prefixing every field individually
- conditional postfixing (depending on presence/absence of things)
- special routines for index entries
- special automatic fields (date, page number ...)

Form level

- length, width
- header, footer
- form/page/line breaking

File level

- initialization
- termination

The export module understanding this language is built into all "allegro" programs except the sort program.

Epilogue

"allegro" dates back to origins in 1980. At that time, this author began experimenting with an 8-bit micro which then, in 1981, became the first to be introduced into everyday library work in Germany. In 1985, the then "old" software had to be abandoned for reasons of non-portability with relation to the then established "industry standard". A new approach was made in the language C, with future portability in mind, especially into UNIX environments.

Beside "allegro", Braunschweig University Library had other "first" micro applications in the years 1981 to 1984, all on the mentioned 8-bit machines, all developed in-house in BASIC and assembler language:

- word processing ("ABI-Technik" 3(1983), p.103-108)
- communication with mainframe (dialog and file transfer) ("Inforum" 15(1982), p.24-29)
- user instruction (hypertext-like, although without graphics). ("Bibliotheksdienst" 17 (1983), p.1018-20)

Today, "allegro-C" is being used in over 50 installations in West Germany. In fact, there may be many more, because a number of registered users are universities holding campus licenses that entitle them to circulate it on the campus.

"allegro" is the only software that is currently known to be in use in the libraries of both Germanies. In the East, efficient use of resources (processor power and disk space) is of prime importance, and this makes "allegro" all the more attractive. The Deutsche Staatsbibliothek in East Berlin serves as the East German distributor and staff at the data processing center there are busy with implementing a UNIX version on a VAX-like machine. This UNIX version will later be re-imported and used in the Herzog August Bibliothek Wolfenbüttel. This is the first example of productive cooperation between East and West in this field.

The Data Universe

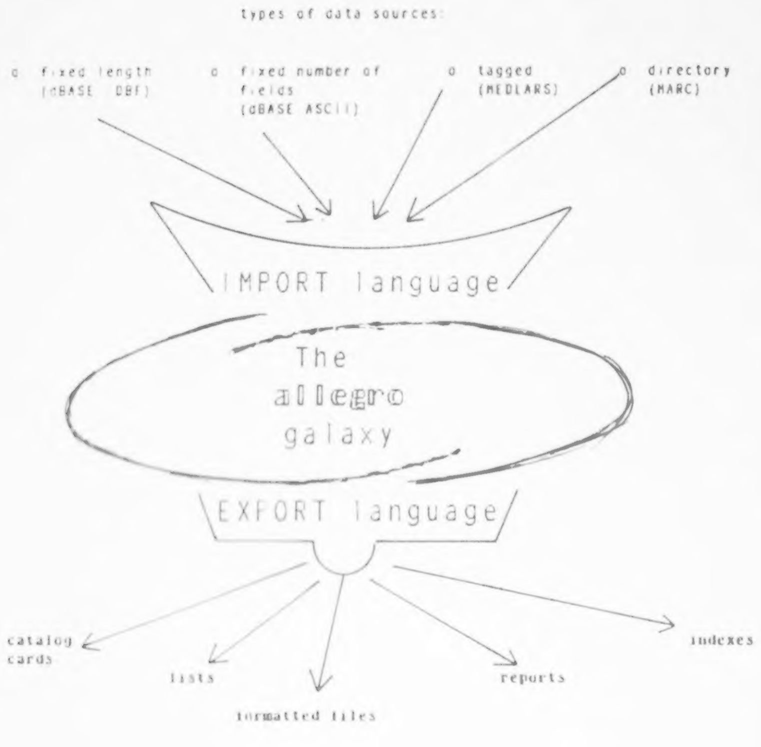
types of data sources:
o fixed length (dBASE DBF)
o fixed number of fields (dBASE ASCII)
o tagged (MEDLARS)
o directory (MARC)
IMPORT language
The allegro galaxy
EXPORT language
catalog cards
lists
formatted files
reports
indexes

Fig. 1

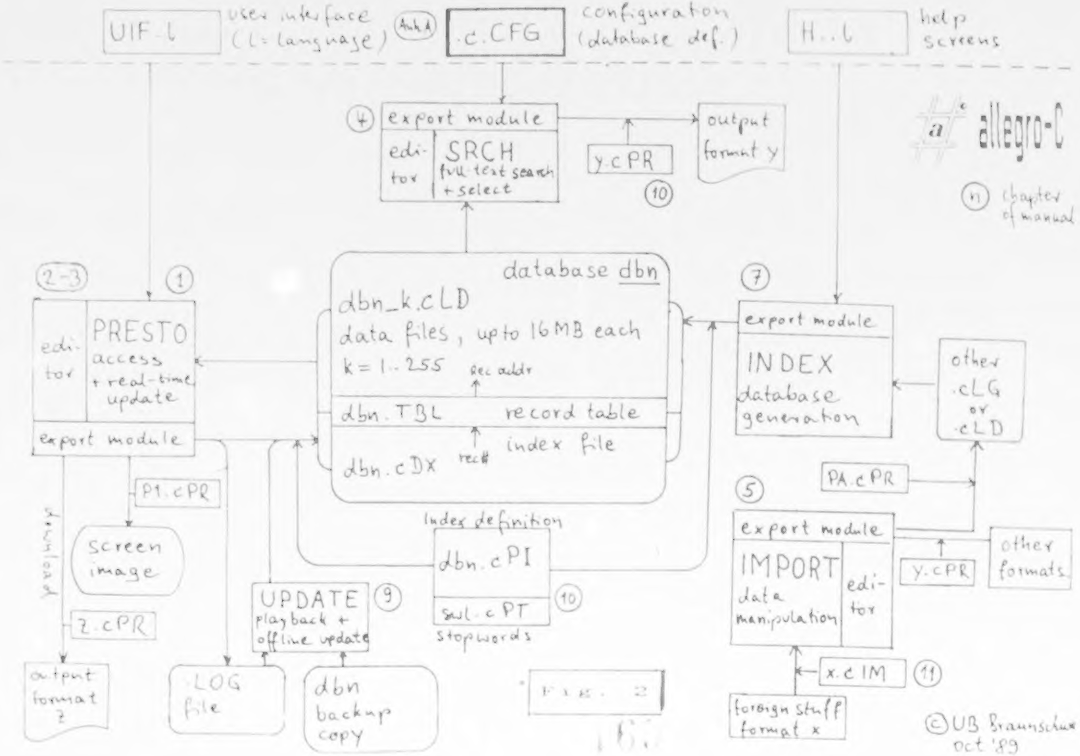
UIF.l
user interface (l = language)
Anh.A
.c.CFG
configuration (database def.)
H..l
help screens
④
export module
editor
SRCH
full-text search + select
y.cPR
⑩
output format y
allegro-C
ⓝ chapter of manual
(2-3)
①
editor
PRESTO
access + real-time update
export module
database dbn
dbn_k.cLD
data files, up to 16 MB each
k = 1..255
Rec addr
dbn.TBL
record table
dbn.cDX
rec#
index file
⑦
export module
INDEX
database generation
other .cLG or .cLD
PA.cPR
⑤
export module
IMPORT
data manipulation
editor
y.cPR
other formats
x.cIM
⑪
foreign stuff format x
P1.cPR
screen image
download
Z.cPR
output format z
.LOG file
UPDATE
playback + offline update
⑨
dbn backup copy
index definition
dbn.cPI
⑩
swl.cPT
stopwords

FIG. 2

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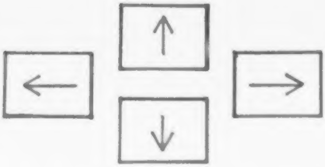
Oct '89

User's View

Access Control Panel



up the alphabet

look up a
different record?
go back to index

look up a
different term?
just enter it!

down the alphabet

Reference Book Analogy

left:

reference sections

right:

index sections

Fig. 3

Authority Control

not built into allegro

but configurable

-- field tags

-- prompting

&

parametrizable

-- export/import/display of authority records

-- indexing/referencing

standard allegro configuration:

- personal names
- corporate names
- uniform titles
- series titles
- subjects
- classification

Fig. 4

Data Conversion: Capabilities and Possibilities for Microcomputers

Kate Noerr

IME Ltd.,
London
United Kingdom

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Data Conversion: Capabilities and Possibilities for Microcomputers

Kate Noerr
IME Ltd., London

Abstract

This paper considers the considerable uses to which microcomputers can be put in handling data conversion. Data conversion is a constant problem for libraries, including conversion of "foreign" MARC records into the local system, and exchanging data with other systems. With suitable software, the microcomputer can tackle all of this range of tasks. This software must be efficient in operation, easy to use on an occasional basis, capable of reconfiguration for new or changing formats, and have an extensive range of functions. The paper discusses such software, and the benefits of it to the library.

Data Conversion: Capabilities and Possibilities for Microcomputers

1. Introduction

Data conversion until fairly recently has been considered the province of mainframe computing and dataprocessing departments. This is partly because it is normally handled on an "as needed" basis, and partly because of the volumes which are presumed to be involved. In library computing, the majority of library installations today require conversion of machine-readable files of one sort or another into the chosen automated package. Most vendors regard this as a necessary evil, and usually write special software for each job.

However, with an ever-increasing number of libraries automating, and with an ever-increasing supply of machine-readable records available, and no reduction in the number of formats, automation vendors are having increasing difficulties in meeting the needs of customers in this area.

Vendors are faced with either hiring a service bureau to perform these conversion tasks, or writing specialist software themselves. Hiring a bureau is a reasonable option, of course, provided that the bureau understands bibliographic data. Often a vendor will pass on the entire "conversion" operation to such a bureau, and the bureau will handle keyboarding of data as well as some amount of converting of machine-readable files.

Writing specialist software can, and is, done. The best approach however would be to write general-purpose conversion software, so that all that is required is a "tailoring" operation for individual needs.

The traditional approach for the vendor choosing the latter course, would be to use the hardware normally supplied to the customer. Since it is assumed by the vendor that the vast majority of cases where conversion is needed is in the large library system world, then of course since vendors are usually suppliers of turnkey systems, the hardware platform for conversion will be their mini or mainframe.

This approach has severe limitations. Those limitations are in the programming languages and capabilities of large-scale computing, and in the portability of the solution, as used in the library world.

A far better method is to use the superior facilities of the microcomputer. The microcomputer has very real advantages both in terms of power and in ease of use. It is a misnomer to think of the microcomputer as "small". While it has some obvious limitations in comparison to mainframe computers, for data conversion there are very few, if any, limitations.

Microcomputers offer better utilities for the average user, and of course, the user interface is significantly more advanced than is that of large-scale computing. Users have the advantage of better windowing techniques, better use of colour, function keys, more ergonomically designed screens, and so on.

All of these facilities and features can, and should, be taken advantage of in the data conversion process.

2. Data Conversion

Data conversion is one of the more difficult jobs in computing. Few designers, analysts or programmers are really interested in what is popularly known as "dirty" data. In addition, bibliographic data is about as "dirty" as data can get.

Bibliographic data, in order to be successfully converted, must be read, formatted, re-formatted, indexed, sorted, merged where appropriate, rejected where appropriate, stored in the relevant database, and/or output into yet another format. That's asking a lot of software.

Let's look at a relatively normal library automation situation. The library purchases package x. The library has 30,000 records stored on the in-house mainframe system which it wants converted and put into package x. The library also wants a selection of PICA, OCLC, Dialog, and STN records converted, some 50,000 in all. Then , of course, there are the 2,000 serial titles on the stand-alone serials system, now to be dropped for package x. And there are the reference files on the dBase III system somebody's friend did for the library. There are also the special collections from Portugal in a version of Unimarc.

The library also wishes to exchange records with an equivalent library in Sweden, and therefore wishes to export selected records in LIBRIS

MARC exchange format, and to receive selected ones in LIBRIS download format (leaving out any questions of the legality or otherwise of downloading from different formats).

The vendor of package x now has data in multiple MARC formats (LIBRIS MARC download and exchange, OCLC MARC, PICA/NL MARC, Portuguese Unimarc), in Dialog's and STN's tagged, variable length formats, in dBase's comma delimited format, and in the in-house system's format (we'll say it's fixed length, even fixed position which is common in these sorts of systems).

This is a formidable job for most vendors. The vendor is apt to turn the whole "mess" over to a service bureau, which may opt for re-keying everything. This has the sole advantage of resulting in reasonably accurate records. It is, however, expensive.

An alternative is for the vendor to write specialist software.

The best alternative, however, is for the vendor to contact one of the very few providers of specialist software which can handle all of the above types of data, and more.

3. The Converter

IME Ltd. not only produces its own library management package, TINlib, but has long since provided data conversion capabilities as part TINlib. Recently, IME has taken the TINlib conversion facilities and produced a new product, currently called The Converter. This product is used only as a stand-alone format to format conversion tool.

The Converter recognizes different formats of records and allows their data content to be broken down into atomic units (data items) which may then be re-built to form records of similar content, with a different format.

All of the information on record recognition, data extraction, re-construction of the output record, and overall process control, is contained in a number of user-defined profiles.

3.1 Profiles

Each group of profiles has a unique name taken from the name of the control profile. Each group consists of three or four profiles: one control profile, one conversion profile, and one or two of input and output profiles.

The Converter is invoked by use of a function key. A menu of profile group names is presented to the user. One of these may be selected appropriate for the type of records to be processed, and for their final destination.

Once this selection has been made, the profiles are loaded and any unresolved parameters are prompted for (i.e., the name of the file containing the records, where to start and where to stop in the file, etc.).

At this stage, after all necessary values have been supplied, the conversion starts; it will continue until the required end point has been reached, or the file is finished.

During the processing, different levels of display are available to notify the user of progress. These range from just a simple record number count to tabulation of the record count and total and average processing times.

3.2 The Converter Features

Records may be read from a variety of sources, with or without some initial processing. They will be recognized by The Converter as complete records by one of a number of criteria: e.g., number of characters, blank line, special tag, etc.

After recognition, the record is passed from the reading function to the reformat function. Reformat isolates single portions of the record as text strings. These data are usually identified by a combination of field tag, start and end delimiter strings, and start and end character positions.

The data items may be placed directly in an output field or may be assigned to an internal dummy field for further processing. Output fields are created by concatenating the data items.

Both data items and complete fields may be surrounded by predefined text and may undergo various text or character related processing, such as splitting to length, removing end blanks, etc.

Both the whole incoming records and individual fields are subject to a variety of operations, as described below.

The entire reformatting process is driven by the description of the required output fields. Input and dummy fields may be processed multiple times to create one or more output fields.

Once the output record is complete, it is passed to the output function and is physically written as required, with appropriate physical manipulation if necessary.

The entire process is controlled by the control function of the module which keeps track of records processed, time taken, active functions, and monitors for user or system interrupts in the correct mode of operation.

3.3 The Converter Functions and Limitations

The Converter has two main functions, in addition to the control module: one to recognize incoming records, and one to reformat a single record.

It operates on the following premises:

- all records in a single file have the same format and require the same processing;
- each record is independent of all others and can be reformatted entirely of its own data elements.

There are, however, some exceptions to the above:

- a file may contain more than one record type as long as they can be processed independently by a conversion which will affect only one type at a time;
- data from one record can be preserved and added to each subsequent record;
- in cases where two or more records must be merged to create a single output record, it is possible to perform some conversion and store the records in a temporary database, and then export the merged records as required, including converting or re-processing them.

3.3.1 Control

Control facilities include access protection, and the ability to operate in background, foreground, or interactive modes. Other features include specifying both the source and destination of the records, including type of device (disk, printer, etc.) used. There is a diagnostic facility which has 9 different levels, each of which is a superset of the previous. The conversion process can be displayed in detail, even to scanning the incoming record to identify the currently required data item. These diagnostic displays are also designed as an aid to developing profiles.

Statistics as to the total number of records processed in this run, as well as the total and average times for both the record total and the last "n" records are available. These results may be displayed to the screen or be logged to a printer.

3.3.2 Record Recognition

Some facilities of the record recognition process are:

- start, stop numbers;
- handling of fixed length records;
- handling of variable length records;
- handling of tagged records;
- handling of special structure records.

For example, in the last case, special structure records, MARC records may be de-spanned if necessary, and then converted to the tagged format by the directory.

As part of the input processing, the following transformations can be performed:

- character dropping
- character substitution
- string substitution
- tab character expansion
- padding character removal
- extraction of common data
- handling padded/spanned blocks
- allow incoming data to be used in outgoing fields
- allow dropping of data
- allow fixed data to be added
- allow conversion of codes to text
- allow incoming fields to be concatenated
- allow repeats of the outgoing field
- allow selection of data at various levels
- allow combinations of the above at various levels
- allow delimiter to be character/strings/lists
- allow data level string substitution
- allow field level stop/go lists
- perform conditional conversion under various conditions
- allow conditional combination
- allow default insertion

- allow individual user scanning for rejection
- allow user editing after conversion
- allow various output destinations.

4. Microcomputers and Conversion

At this stage, it is clear that The Converter is a comprehensive piece of software. Not only is it comprehensive, but also it is used in a relatively unique way.

It was built to be a "do it yourself" operation, and to be significantly less expensive than other conversion alternatives. Because The Converter is microcomputer-based, it is far more flexible, and therefore it is considerably quicker to profile, or parameterize, user-defined options.

In an ideal world the ISO 2709 data exchange standard would be standard. Since the ideal world does not exist, and since we are very very far from ideal, there are, as we all know, large numbers of variations on MARC, whether they be exchange, download, display, or any other MARC-based format.

Because of the need for "variations on a theme", The Converter is set up in a way which makes it easy and quick to adapt to local conditions. As stated before, however, not only can The Converter handle MARC-type data, it can also handle other tagged/variable length data, and virtually all other known types.

IME runs a bureau operation in-house, using The Converter, and it also leases the software to customers to process their own data. The entire operation is run on microcomputers. A single microcomputer, with about 12Mhz clock speed, can convert a record in from 3-5 seconds. The micros can be run unattended for large length of time, as they can be set up to read files and tapes at any specified period.

Taking the 5 second figure, an average of 15,000 records can easily be handled by one micro in one day. One micro can handle in excess of 100,000 records in a week.

Obviously faster micros can process the data faster, and multiple micros can be used to handle large loads. In fact, it is not uncommon to have 6 or more micros converting data simultaneously at IME. IME has turned around jobs of 750,000 records in a week, using 7 micros at once. The files can be merged prior to loading into the target system, or upon initial load.

Of course, any computer with a faster clock speed will run faster. It is easily possible, with current micros, to process the records in 2-3 seconds/each. It is of course sensible to think of transferring the operations to a mini or even mainframe computer. However, the expense of the hardware, which would necessitate raising prices, does not seem to justify the operation. In addition, the ease of using micros, the ability to leave them unattended, the possibilities for relatively untrained persons to operate the entire process, all make it certain that IME will continue to run The Converter on micros.

The advantages to libraries are obvious: comprehensiveness, flexibility, speed, and relative cheapness.

A Scenario of OSI Based Library Cooperation

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A Scenario of OSI Based Library Cooperation

Morten Hein
Danish Ministry of Culture

Abstract

Introduction

The European Commission has in its Plan of Action for European Libraries made a proposal, that surely will encourage European libraries to a higher degree of cooperation.

It can be generally anticipated, that this cooperation will be driven by information technology, especially the OSI (Open Systems Interconnection) concept. That is a general development of computer standards, that will enable incompatible computer systems to communicate and interwork.

These standards are made in ISO, the International Standards Organization, also the special library applications. Special European functional standards for uniform European applications are developed.

The money that hopefully will be attached to the Commission plan can be used to explore the possibilities for the benefit of those who try and for the rest of the library community.

Discussion

The library world - at last used to computers - is now presented with new possibilities - and problems. The key words are: Libraries, service to the users, computer systems, cooperation and OSI.

How do we mix all those elements to create a useful future.

The headline is: 'Better cooperation through OSI technology'. That is of course simplified.

It can be observed, that there is a general interest in increased cooperation among libraries. This must be caused by a mixture of diminishing resources and a steady increase in the demand for information.

From our present concept we can make imaginations of how we can increase cooperation. But before just doing so, it is necessary to ask: Will the new means in information technology change our concept, so that our present imaginations are outdated? They could be fine, but perhaps we can ask for more.

Study

To decide this it is necessary to make a circular study on the two elements: Technical possibilities and the library concept for cooperation.

To this some professional/political issues should be added and also the problems of applying the future possibilities to the present situation.

Much of the future developments will be limited by elements from the starting point. So much is already invested in library information system, so it can not be done again for the sake of a change. Because a last element is very important: Whatever we imagine, our imaginations shall always be justified from an economic angle.

Microcomputers: Future Prospects for the Oxford Library System

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Microcomputers: Future Prospects for the Oxford Library System

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Abstract

Most of the Oxford University Libraries will eventually join OLIS, a networked library system based on the IBM product, Dobis/Libis. The Radcliffe Science Library, an original participant, began cataloguing all new books on the system in September 1988 and intends to begin using the Periodicals Control, Acquisitions and Circulation modules during 1990. Our experience has already shown that a role has developed for microcomputers which greatly exceeds what had been envisaged. The paper examines critically the current use of microcomputers with reference to the special requirements of such a computing environment, and outlines the major problems that have been encountered and the strategies adopted to tackle them.

Forthcoming developments in microcomputing promise greater capabilities, but at what price? Wishing always to improve service to his users, the manager must consider the implications of enhancing existing systems or migrating to new hardware and software.

Microcomputers: Future Prospects for the Oxford Library System

Introduction

Literary research for the Oxford scholar can be a wearisome activity, with about 65 university libraries and 40 college libraries, varying enormously in scale, scope, degree of specialisation, resources, regulations and opening hours (¹). The Bodleian Library itself, which can be regarded as the main University library, in fact comprises the main Bodleian and four, physically separate, dependent libraries, (the Radcliffe Science Library, the Bodleian Law Library, Rhodes House Library and the Indian Institute Library), and its collection is correspondingly dispersed. From just one location, the Lower Reading Room of the Old Bodleian, readers can search the complete holdings, but even then they may have to consult all four of the chronologically distinct catalogues whose differences in coverage are sometimes a little subtle for readers: i) the *Pre 1920 Catalogue*, pre 1920 publications, ii) the *Post 1919 Catalogue*, works published from 1920 onwards and catalogued up to 1986, iii) the *Interim Card Catalogue*, works published after 1986 and catalogued before September 1988, and older books published since 1920 and catalogued before September 1988 and, iv) *OLIS*, Oxford's OPAC, all books catalogued since September 1988. Only the last provides a shelfmark for a work housed in one of the dependent libraries, otherwise the hapless reader might still need to go and consult that library's catalogue to find it!

This is the context in which, under the auspices of Oxford University's Libraries Board, we have embarked on a programme of automation, and it is hoped that in time most of the hundred or so university and college libraries will join OLIS, the Oxford Libraries System(²). Eventually, when

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(¹) For details of the Oxford libraries, see SHAW (1981) and MORGAN (1980).

(²) The O.U. Libraries Board and the Faculty Boards are responsible to the General Board (Academic) which allocates their funds. The General Board, in turn, answers to the University's ruling body, the O.U. Governing Body. The Oxford Colleges, on the other hand, are independent of the O.U. Governing Body and govern their libraries themselves.

retrospective conversion has been accomplished - a daunting task, the Bodleian alone has approximately five million works - Oxford will have an online union catalogue of excellence, consultable throughout the world. The chosen system is the IBM program offering, DOBIS/LIBIS(3), running on an IBM 9377 Model 90, accessible over the university data network and through the U.K.'s Joint Academic Network (JANET)(4).

We have installed DOBIS/LIBIS as a network of *local libraries*, the fundamental units, which are administratively distinct, but bibliographic records are system-wide, visible to and shared by all the libraries. When he begins a session, a user of the OPAC is prompted for the library of his interest and, having located an item, will preferentially be shown copies from that library. It is only if his library does not have a copy that he will be shown the other libraries' holdings.

The original participants, namely, the Bodleian and its dependent libraries, which are grouped as one local library, began cataloguing all new accessions on the system on 13th September 1988. Other libraries have since joined; the network currently numbers twelve and is growing as fast as new members can be trained and accommodated. They include four libraries - the Modern Languages, English and Social Studies faculty libraries and the Hooke Lending Library for science undergraduates - whose catalogues were retrospectively converted during an earlier Libraries Board pilot project, using the OCLC LS2000 system, and have now been successfully transferred to OLIS.

DOBIS/LIBIS is an integrated library system; having started with the cataloguing module, we are now in the process of introducing circulation for the Hooke Library and we intend implementing the acquisitions and periodicals control modules in selected libraries during 1990. The bibliographic record, however, is the cornerstone upon which all the other library processes rest, and it is in the creation, or rather capture of bibliographic records of AACR2 level 2 standard that we have seen an unexpectedly high dependence of cataloguers on microcomputers.

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(3) Oxford University is currently running Version 1 of DOBIS/LIBIS. Version 2 has the full IBM product status.

(4) For a brief description of JANET, see QUARTERMAIN and HOSKINS (1986) pp 947-8.

Downloading Bibliographic Records for OLIS(5)

Copy cataloguing is the preferred method for generating bibliographic records. A cataloguer will usually search the following sources sequentially until he finds a suitable record, and will only resort to original cataloguing if this fails.

1. The OLIS catalogue. An extant record can be used directly, or as a basis for a similar record by copying and editing.

2. The bibliographic pool. This is an area of DOBIS/LIBIS where records are kept before being introduced into the live catalogue and which cannot be viewed through the OPAC. Each week the pool is loaded with the British Library UK MARC records having first been converted to OCLC MARC (using a SPITBOL program on the University Vax Cluster) and then into DOBIS MARC (via the PL/1 loading software developed by Emory University). This is a useful source for recent U.K. publications, as it matches closely Bodley's copyright intake - being a library of national copyright deposit, like the British Library, it can claim a copy of every book published in the U.K. We also hope to mount the Library of Congress CONSER records here. A pool record can be transferred directly to the main catalogue for editing or copying and attaching copy information.

3. The CURL database. Held by the University of Manchester Regional Computer Centre, this database comprises UK MARC records contributed by members of the Consortium of University Research Libraries. It is accessible through JANET and the service is free to members(6).

4. OCLC. This is searched last - though a good source, we must pay for the searches and the telecommunications.

When searching a remote database, as in 3 and 4 above, a microcomputer is used with Kermit providing terminal emulation so that the session can be logged and saved to disc. A SNOBOL program then strips the records of unwanted data, converts them to OCLC MARC format and changes coded diacritics to the single character equivalent before they are edited locally and transferred in files, again using Kermit, to the University mainframe. Each day, records shipped to the Vax cluster in this way are collated, written to tape in OCLC MARC exchange format, taken to the IBM 9370 and loaded into the bibliographic pool where the cataloguers can find them and transfer them to the live catalogue.

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(5) The methods we use for acquiring records from remote databases were originally conceived by Tom Crawshaw, the Libraries Board Head of Automation, during the LS2000 pilot project. He and others, in particular Neil Sanderson and Geoffrey Neate, have continued to develop and refine these techniques.

(6) For more information about the CURL database, see PERRY (1988).

Though the same results could be achieved through mainframe to mainframe connections, lacking such resources, microcomputers have provided us with a successful method for downloading and we shall continue to use them in this way for the foreseeable future. Cataloguers prefer to be equipped with microcomputers as opposed to terminals as this enables them to schedule their own work and avoid having to book microcomputer time for downloading. Many also like to have a microcomputer which they can use for other aspects of their work, such as wordprocessing. A microcomputer so employed must have a hard disc to accommodate the data and software, and a graphics card of at least EGA standard so that the full range of OLIS's diacritics can be used. They are set up by the Libraries Board Automation Team in order to facilitate maintenance and distribution of the suite of software needed for downloading records, and to this extent a degree of standardisation, with respect to software configuration and minimum level of hardware, has been established.

Other Developments

The microcomputer's ability to download data for local processing is the reason for its widespread use in the Oxford libraries for communications. Apart from the projects mentioned above, many libraries now use electronic mail and staff are more frequently searching the 44 OPACs currently available through JANET, often for interest as well as for help with bibliographic enquiries. Some libraries provide access for their readers to remote bibliographic services - at the Radcliffe Science Library, to DIALOG, DATASTAR, Blaise, CAS ONLINE and ESA - and again, the microcomputer provides the most suitable platform. Kermit is used widely in Oxford for file transfer and terminal emulation, usually VT102 though it can provide others. Recent releases of Kermit provide for good autolog scripts; previously we have resorted to a Superkey-Kermit hybrid we call imaginatively Superkerm for our autologs, though this was crude, relying solely on timed pauses between output.

Microcomputers are used widely for wordprocessing and mailshots. WordPerfect 5.0 has become the most widely used package; it is supported by the Oxford University Computing Service which provides courses that our staff can attend. Desktop publishing has not really penetrated the Oxford libraries, but it is likely to if hardware and software prices continue to fall.

There is growing interest in CD-ROM databases. To date, the English Faculty Library has the *Oxford English Dictionary;* the main Bodleian, *Ibycus* and they are awaiting delivery of a second machine on which they will mount the *British Library (General) Catalogue and U.K. Official Publications,* with a view to adding others that are in demand - candidates are *Dissertations Abstracts, Ulrich's Plus, Books in Print Plus* and, when it is available, *OED II;* the Cairns Library, *Index Medicus;* Templeton College of Management Studies Library, *ABI-Inform* and *FAME;* and the Institute of Economics and Statistics Library is acquiring the *Social Science Citation Index.* At the Radcliffe Science Library, we provide the *Science Citation Index, Books in Print Plus and Ulrich's Plus,* and staff are using several other CD-ROMs on a trial basis.

Spread-sheets have not been used to any great extent in the Oxford Libraries whereas database management packages have, which suggests perhaps librarians prefer looking things up to working them out! Many libraries have been running locally produced database applications serving a variety of purposes: for catalogues and inventories, statistical analyses, mailshot lists and records of transactions. Since cataloguing began on OLIS, some of them, for example, a sophisticated catalogue card production system linking several libraries, are now redundant. The same will happen to others as their functions are subsumed by the integrated system.

Nevertheless, no large-scale system on the market, in terms of its structure, is going to map directly on to the Bodleian Library, and even less on to the network of University libraries to be served by OLIS. Libraries will change their internal organization to fit better the topology and functionality of the mainframe system, but the latter will not always be able to incorporate all the library and administrative processes which can benefit from automation. A feature of micro-based applications is the speed with which development can take place allowing a rapid and flexible response to users' changing requirements. OLIS can be modified, to bring it closer to what is wanted, but the process is ponderous in comparison, and a high degree of customisation for individual users is not possible. First, users must agree on what they want, which takes time when the views of the staff in a hundred libraries and thousands of readers in what is probably the U.K.'s most democratic university must be considered! Having written new software to incorporate changes, its implementation has to be carefully planned: users who will be effected must be informed beforehand and whatever documentation is necessary, produced and distributed. In contrast, given some expertise, local microcomputer applications can generally be developed, brought online and modified very rapidly. Further, with only local needs to satisfy, they can be customised to provide special functions for local users to a degree which would not be possible on a monolithic integrated library system.

As an example of a simple task which cannot easily be catered for on the mainframe without considerable programming effort, let us consider the generation of shelfmarks. Most of the shelfmark schema in the University comprise ascribing the copy in question to a physically distinct section according to one or more criteria, e.g. publication type, subject, size, access, rarity, and then allocating a unique running number, usually the next free one. With thousands of growth points in the Oxford libraries, new ones being regularly created and no fixed format for shelfmarks, it is beyond the resources of the developers to provide a routine which would free staff from maintaining running number systems of their own devising, usually, a manuscript or micro-based handlist.

Managing a Department's Microcomputers

By and large, the extent to which microcomputers, or computers in general for that matter, have been exploited in the Oxford libraries has depended on the financial and human resources available to an individual library and the enthusiasm of its staff. In these respects the Radcliffe Science Library has been relatively fortunate. Microcomputers first began to appear here about five years ago. At that time we were guests on another organization's mini-computer which meant we were free from handling operations and security. We have gradually moved all our applications from the mini to our micros. It has been very obvious to us that careful management is necessary if our library staff, numbering 51 (equivalent to 35 FTE), is to benefit fully from the 20 or so microcomputers now at our disposal.

We were extremely concerned to be losing what was effectively a LAN and so investigated networking the micros. Having decided it would not be cost-effective at that time, we chose to make our databases accessible throughout the library by the simple expedient of backing them up and restoring them on to the machines where they were needed. Despite the discrepancy between DOS versions of backup/restore, this has worked very successfully. The one minor restriction we have to impose is that editing can only take place on a specified machine (except by special arrangement).

The computing section takes floppy disc backups according to a predetermined schedule for those databases which are regularly updated, and at the owner's request for relatively static data. On average, it takes one member of staff 3½-4 hours a week to take the backups (which must be done for their own sake) and redistribute the data.

A corollary of this method is that we have established a common directory structure with systematic naming conventions, so people soon become familiar with our microcomputers. DOS lives in \DOS, commercial software in their default sub-directories, programs in their own sub-directories and data elsewhere. Editing and searching versions of the same program are named differently and kept in separate sub-directories.

The root directory is kept free for bat files and certain DOS enhancing utilities: a command line editor which is loaded at boot-up, a text editor and tools for maintenance and problem diagnosis. We have finally found a suitable screen saver. The keystroke to wake it up is not transmitted to the underlying program; moreover, it is possible to set the attributes of the 'dead' screen so that a faint image of the application can be seen. Not only does this lessen the likelihood of people switching the machine off, thinking they are switching it on, but we have also found that it encourages readers to look at the machines and so discover they are meant for their use.

There is always a sub-directory called \TEMP in which anyone can save files in the knowledge that it might not be there next time they look. Machines running wordprocessors have a sub-directory called \DOCS which can be used by anyone who happens to sit at that machine. WordPerfect will allow the setting of password protection on files if there is a need for confidentiality, and staff are free to create their own sub-directories for wordprocessing and, if they should so wish, options to run the wordprocessor using these sub-directories will be added to their menus.

In order that a member of staff with little knowledge of microcomputing can sit down at any of our machines and use it, we have adopted a common configuration, features of which are described above, and a common user interface. When a machine is switched on, the path is set so all the applications programs can be found and the autoexec calls a batch file (\MENU.BAT) which runs a simple, but rugged, menu system. The menu lists applications that are always available on that machine and which can be invoked by keying in a single character in upper or lower case. Any set from the full range of our applications - databases, autologging to remote hosts, CD-ROM software, wordprocessing etc., - can be mounted on a particular machine provided it has sufficient disc space and the necessary peripherals. After leaving an application, control is returned to the menu system.

Although the menu system can only be broken out of by re-booting, we have effectively removed the possibility of people (especially readers) taking up the challenge by always providing a last option, printed in red, 'Q Quit to DOS!'. Much more importantly, we wish to encourage those who can use DOS commands, both staff and readers, to do so; and when appropriate, we drop them in the sub-directory they are most likely to want to use, as in the case of users of the Science Citation Index in the example below.

On machines which readers use, we change the DOS prompt to say something like:

```
*** Enter MENU to see applications menu! ***
C:\SCISAVES>
```

In addition, as we have often found our machines at the DOS prompt frequently still displaying failed attempts to elicit a response, we include a file called \HELP.BAT which calls the menu system!

Current Concerns

It is necessary to keep abreast of developments in order to provide the best possible service to our users. I shall mention briefly several areas of immediate concern to us which we are actively researching.

Readers are beginning to bring portable and luggable micros to the library so they can key in their notes directly. We have to make decisions of policy: should we allow them in, should we place them away from other readers, should we allow them to use our power-points, and if so, should we charge them? Should we be providing micros for readers to work on as they please, as well as those which we regard as an extension of our information service, like the CD-ROM machines(7)? Some readers are asking if we can supply them with journal articles on floppy disc. We shall be looking at the feasibility of setting up a Data Image Processing system to scan articles to complement our photocopying service.

To continue with DIP, and a notion we have of how computer-literate readers will be conducting their literary research in libraries in the very near future, there are now on the market hand-held optical scanners for less than £150. By merely passing them over a page, the printed information can be input directly into the computer to which they are attached, much easier and cheaper than taking the book to the photocopy department and filling in copyright forms, no chance of typographical errors and far less arduous than typing up notes at home. At present, good, cheap OCR software is not available, so the results would be equivalent to a photocopy, but when it is, and it surely will be, the information gleaned from the library could go directly by this method into the readers' own information database for searching and analysis, and selected data copied into documents and bibliographies.

At this Symposium, we have discussed in detail the main limitations of CD-ROM(8). In addition, the software is not always easy to install: we have experienced hardware compatibility problems. The equipment is relatively expensive: we use hard disc 286 machines with high density 3$\frac{1}{2}$" and 5$\frac{1}{4}$" floppy drives, single CD-ROM players and printers. Some databases are better suited to CD-ROM than others. Searching can be positively arduous when a database spans two or more discs. Of course, computer-based systems provide more points of access to the data than their hard-copy equivalents, but conversely, with our present equipment, only one person can search one year of the *Science Citation Index* at a time, whereas the hard-copy cumulations cover five years and are truly multi-user(9).

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(7) Bath University Library is installing a large number of microcomputers for their readers' use. (Personal communication from Mr Lamble, the University Librarian).

(8) For a comprehensive discussion, see DESMARAIS (1988) Chapter 4, pp. 59-67.

It is possible that we could attach a CD-ROM system to the University data network in order to provide wide access in a way very similar to that tried by the Polytechnic of Central London(10), but we feel that a single-user system with limited disc capacity would fail to meet demands and expectations. We are waiting for improvements in CD-ROM technology in the realms of networking and stacking, but will watch for alternative platforms for the databases providing better facilities.

As explained above, copy cataloguing is the mainstay of bibliographic record creation on OLIS, and it relies heavily on microcomputers. We are always looking for alternative sources which could increase the efficiency of the process. It is necessary to be able to incorporate them into the existing downloading system seamlessly so there should not be a proliferation of methods by which records are loaded into OLIS, and also to obviate diverting scarce programming resources from other projects.

Many of our readers use their microcomputers to access OLIS even from their homes. What they appear to want most, particularly the scientists among them, is to be able to view our serials holdings: they want to know, for example, if we have received the latest issue of *Nature*, and where it is located. At the Radcliffe Science Library, our chief priority is to move from manual, to automated serials registration on OLIS, making use of the periodicals control module. It will entail retrospective conversion of our serials titles and inputting holdings data, and we hope to achieve this within the next two years.

EBSCO's *The Serials Directory* on CD-ROM looks as if it could be very useful to us for the retrospective conversion of our current serials. Its coverage and quality of records match our needs well, and it would be cheaper than dialling OCLC: we think that if we used it as our primary source, we would very rarely have to search another, and would so speed up the process of locating and downloading records. Further, working from CD-ROM avoids the communications and down-time problems which can hinder the use of remote hosts.

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(9) We have just received Version 2 of the *Science Citation Index*. The search software is greatly improved and has a strong family resemblance to *Current Contents on Diskette, Life Sciences* which we have for our readers. With Version 2, one disc holds a complete year's data - previously, it took two.

(10) SYKES and PRETTY (1988).

To our surprise, the search software only permitted two output options: either records can be printed in MARC display format, or saved to disc in MARC exchange format. We need display format on disc, firstly, because we edit the records locally before sending them on their journey to the 9370 (cataloguers find editing on their micros easier than on OLIS), and, secondly, the download suite of software can currently accept only MARC display format. Our attempts to provide a local fix without amending the code failed (see below); we were more successful in our approaches to EBSCO who have assured us that the next release of software, due now, will be able to output to disc in MARC display format.

First we tried to load a memory resident program to allow us to cut and paste between the CD-ROM and the TSR programs; next we loaded an IBM User Group program called LPTX to redirect printer output to a disc file. Both attempts to get the records on to disc in MARC display format failed because the CD-ROM software itself needed almost all the available memory.

The general problem of the DOS 640k barrier is one that we are encountering more often as commercial software becomes increasingly sophisticated and memory-intensive, and as we begin to purchase new equipment whose full potential is not automatically realised under DOS. We want to be able to take advantage of advances in hardware, but we cannot afford to replace our old machines, nor would we have the programming resources to enable us to transfer our applications wholesale to a new computing environment. OS2 can run DOS boxes, but at this point in time, this is not a viable solution for us. In the first place, the DOS boxes themselves cannot exceed 640k, and secondly, OS2, itself expensive, needs 4 megabytes of RAM in order to run DOS boxes.

We have been examining the virtual memory manger, DESQview, which, at least in its 386 version on a 386 machine, will allow DOS applications to address up to 16 megabytes of extended or expanded memory. It supports genuine multi-tasking, the transfer of data between applications and will swap applications out to disc when there is insufficient memory to run them all concurrently.

Enabling ordinary 8086 640k PCs to multi-task has been of immediate benefit. Communications programs, which cannot be swapped to disc as they might lose i/o, will run happily alongside other programs provided the latter are small enough. With two serial ports, two modems and two datapoints, we have succeeded in running concurrent sessions on two remote hosts (using different colours on screen so they can be distinguished). Our copy cataloguing methods have been described above and it is likely that output could be increased considerably by running two online sessions at a time: for example, one OLIS session, from which the live catalogue and the bibliographic pool could be searched, and a CURL session, so that if a work is not located on our system, CURL can be searched immediately and the record downloaded (or even transferred directly, field by field, though to do this with ease needs a bus mouse). At present, the book would be put aside in a batch of similar queries, and CURL searched at a later date.

The way in which DOBIS/LIBIS is written means that some data cannot be accessed without 'quitting' or 'filing' the work in hand, e.g. cataloguing a book, to move to another area within the system. Several cataloguers have expressed to me their desire to run two OLIS sessions at the same time in order to overcome this annoying drawback. Again, cut and pasting would be useful to them. For the time being, however, OLIS does not have sufficient ports to allow people to do this on a regular basis.

We have released our first multi-tasking application. On selecting this option from the front-end menu of the microcomputer, the user is automatically dialled through to the OLIS logon screen while PHYSCI, the Radcliffe Science Library Physical Sciences open-shelf books database is opened. The user can toggle between OLIS and PHYSCI and transfer data between them. One important function of this multi-tasking application, referred to earlier, is to generate shelfmarks for transfers or new accessions and enter them on OLIS in a consistent format so they will file correctly.

There are other scenarios where DESQview, or similar programs, could be helpful. For example, it would have provided an answer to the MARC display format problem with *The Serials Directory*. Sometimes we have long print runs which have hitherto tied up a microcomputer, but by running the print programs in a DESQview window we shall be able to continue to use the machine for other purposes.

Though DESQview can be easy to install and use, on the negative side it must be said that setting up a new application or inducing certain software to run on particular machines can be time consuming and require some expertise. Nevertheless, in enabling us to multi-task and overcome the 640k barrier without having to make the transition to another operating system, it promises to extend the useful lifetime of DOS.

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Microcomputers and Local Subsystems. Some Questions of Data Exchange

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Microcomputers and Local Subsystems. Some Questions of Data Exchange

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Abstract

My quick survey discusses some points of interfacing a standalone micro-based library system to a mainframe of a cataloguing network. This may be in reality in online or offline mode.

In the Federal Republic of Germany there are:

- seven regional cooperative systems
- the "Deutsche Bibliothek" as the national bibliographic centre
- the DBI (German Library Institute), with the Serials Database (ZDB), the Union Catalogue of Monographs (DBI-VK) as interregional cooperative system.

The Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) proposed how to cooperate between local and central library systems. Following the recommendation of the DFG, this means that online cataloguing in the central database (as shared cataloguing) and subsets can be copied to the local systems. As a result :

- downloading, uploading, file-transfer facilities, and offline by exchange of data stored on diskettes will be possible.

It is to be hoped, that in the future "OSI" will solve the problems of computer to computer interconnections. But the present problems are:

- emulating the PC as a terminal to the mainframe (in page mode respectively synchronous mode)

- the components of a record are stored on different files, i.e. the software must be able to combine elements of author, title, corporate author, series files to only one record for the transfer to the PC
- how to convert the original record to the local record structure without overburdening the computing power of the micros
- as there are many different cooperative systems in Germany the in-use software has to be able to convert many different record structures to the one used
- would it be possible and recommended to use the standardized German Exchange Format MAB1 as a basis for data exchange in the micro world.

Special points for the discussion are:

1. Sources of catalogue data, their quality and structure
2. Connections to the databases, data-entry and file-transfer
3. Conversion problems for importing and exporting to another local system (MAB1)
4. Character sets, their encoding and representation for
   - data entry
   - display
   - storage
   - filing
   - printing.

Examples will be exposed in my talk from the DBI experiences.

From Here to There and Back Again: Using Remote Session Microcomputer Software for Information Access in Libraries

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Abstract

Microcomputers linked to telecommunications facilities can enhance librarians' traditional responsibilities for acquiring, organizing and disseminating information. They are now able to augment printed texts by extracting digitized bibliographic data and, increasingly, images and graphics, from a variety of information sources: local and distant online public access catalogs (OPACs), bibliographic utilities such as the Online Computer Library Center (OCLC), CD-ROM products, and online databases offered through such vendors as BRS Technologies and Dialog. Librarians face new challenges as managers of multi-formatted information centers, but varied digitized information has complicated, though not fundamentally changed, their accustomed roles.

The opportunity that librarians have now is to link their training and skills to microcomputer and other technologies and take leading roles in their organizations as information gatekeepers. Just as they offer their patrons an increasingly sophisticated ability to acquire information, they can also provide the technological and management techniques to evaluate, control and manipulate it. In order to accomplish this goal, they will need to combine technological, as well as subject, skills. The acquisition of digitized information joined to a conception of information management will lead to a new definition of librarianship, but one that is rooted firmly in tradition.

This paper will deal with general issues of information management and dissemination in libraries and focus on one example: the ability of libraries to use "remote session software" to manage and access CD-ROM and locally created databases, to provide assistance to users of online information systems, and to link, without implementation of a LAN, dissimilar microcomputers. This type of software was originally designed to enable information system managers and trainers to enter the microcomputers of users not on site and provide assistance by using all of its functions. When linked to appropriate database software, such programs as PC-Anywhere or PC-MacTerm, can be used instead to substitute for networks and provide access to off-site information because of their capabilities to utilize all of a distant microcomputer's resources. While that capability is not without associated problems, the ease of use and power of such programs justify examining their capabilities as librarians move into a new information management role.

From Here to There and Back Again: Using Remote Session Microcomputer Software for Information Access in Libraries

The idea of the use of remote session software - the ability to access a distant resource in electronic form - certainly dates back a long time, at least to Alexander Graham Bell and the telephone. Through his instrument, considered as unusual in its time as microcomputers in libraries once were, a person seated at home could gather information from a variety of sources, assimilate it internally, and redistribute it in a new form to other sources.

Remote session software is designed to provide the opportunity for a distant user to gain access to the full functionality of a Host microcomputer. In a more effective way than a telephone, a user can gather, assimilate, and redistribute information. It has been used by microcomputer experts to do remote sessions with new users, by those who want to work on an office microcomputer at home, and for a number of other purposes - such as access to expensive equipment, including laser, or PostScript printers - that seem to keep expanding as the software type becomes better known. It is becoming well known indeed, for a quick search of the literature revealed more than 130 references in the microcomputer press within the last year.

This type of software within a library context seems immediately useful in several applications. But it also suggests itself as a metaphor for the changing nature of librarianship in an automated age. In particular, it relates to the emerging conception of librarians as information managers who use microcomputers and other tools coupled with telecommunications and enhanced remote capabilities to access distant resources in digital or other formats.

The first part of the paper will try to explain why this type of software suggests a broader concept of librarianship. That will be followed by a description of remote session software and its application. I will then describe uses of remote session software in libraries at the University of

Wisconsin-Madison: for accessing CD-ROM and other databases, linking together dissimilar microcomputers, and functioning as an aid to the provision of assistance to transparent users through telecommunications, and conclude with some *thought on future potentials for the* application of microcomputers to information management in the 1990s.

Libraries and the Transformation of Information: Background

In order to understand what I am going to refer to in this paper as the transformation of information, it might be useful as background to focus on what constitutes the time-tested essentials of librarianship. What we do, in one form or another, is Acquire, Organize and Disseminate Information or, as mentioned earlier, gather, assimilate, and redistribute it with value-added products. From Alexandria to the present, librarians have fulfilled roles that Patricia Battin has described as "professional[s] historically concerned with scholarly information support services"(1). In traditional terms we have regarded our functions - and for a long time now - as buying books and periodicals, cataloging them, and providing both transportation and informational mechanisms for dissemination.

In more technologically driven and transformed librarianship, acquiring can mean digitizing images or text as well as buying books; it can mean organizing an image database by attaching various levels of descriptors; and it can mean that information dissemination takes place within a framework that enables librarians to send a mixed media informational packet to someone in the same university, or elsewhere in the world.

These functions fit the traditions of librarianship and also fall very well within what Wilson P. Dizard has characterized as an information society: one that focuses on the production, storage and distribution of knowledge rather than on more traditional industrial functions (2). Therefore librarianship, whatever its future, may already, by Dixon's definition, have become a part of an information society.

Consequently it is not just the role of technology, or of microcomputers, but of information and librarians that needs to be a continuing focus of our attention. Even as we acknowledge the transformation of information and the crucial importance of technology for future information provision, even as we seek to harness the increasing CPU power of microcomputers to meet our goals, we must not come to regard technology as an "add-on" - a new appendage to the corpus of librarianship - but rather as an integral part of the information whole.

The phrases "information explosion" and "technological revolution" have dominated discussions of librarianship for decades. In fact, it is difficult to remember when they were not used. Although perhaps true, as frequently used catch phrases tend to be, they do not adequately depict - even when used together - what is happening to libraries. Instead of explosions or revolutions, libraries are in the midst of a profound, prolonged and, for some, painful period of transformation. As early as 1984 Nina Matheson recognized that

> These are very interesting, turbulent, ambiguous and very disturbing times to be a librarian. One reason is that much information is being deinstitutionalized and dematerialized. Many of the sources for the most up-to-date information have lost their static, immutable qualities and have become interactive and permutable (3).

Perhaps it is this fluidity, this lack of a comfortable mass that discomfits librarians. They seem to be standing on shifting sands as they, or worse, other parts of society, define and redefine their missions, for libraries are not static. They are moving, perhaps at varying rates but still inevitably, from being institutions that provided on site access to materials in unitary formats - predominantly printed or analog - to becoming information utilities. The new form that these transformed libraries of the future will take has been widely debated and described. For example, the prominent journal Online devoted its January 1987 issue to gazing into a crystal ball for beliefs about the future of online searching (4). We have also heard of the image of the "Electronic Library" as used by Patricia Battin or the "Library Without Walls" of John R. Sack that have become familiar and, for many, attractive prospects.

Sack's "library without walls" has the potential to become an "integrator of systems" and librarians will assume the roles of information managers in them (5). In addition, librarians will increasingly come to recognize that their positions as information enhancers, as service providers can become even more important, not diminished, in an electronic information environment. Library users, bewildered by information diversity and methods for access and control, will need more, rather than less, information management assistance. And this assistance, while it can be provided electronically, may more logically take place in an institutional setting.

Libraries and the Transformation of Information: Gateways

Libraries will retain a dual function that Richard C. McCoy, then of the Research Libraries Group, described very well:

> Today's research library is and must be a gateway to the broadest world of scholarly information, regardless of the information's format or source. It must be a channel to machine-readable databases and to sound and image data, as well as to books and periodicals. It must be a facilitator for access to the combined information of private, for-profit resources, as well as those of the public and educational sectors. It must be a channel linking scholars with the local, national and international resources required to support their best work (6).

The current tendency to establish international communication standards and protocols and to merge networks can potentially mean enhanced information access of just this type. In the United States, the merger of CSNet (primarily institutional business members) and Bitnet (educational) into the Corporation for Research and Educational Networking (CREN) has been announced. That means, according to a joint statement by the two, that more than 600 colleges, universities, government agencies and businesses will be linked and mutually accessible. Since the network will cover all 50 states, 32 foreign countries, and also provide a gateway to the European Academic Research Network (EARN) and the national INTERNET which links other networks, it has the capability of accessing not only supercomputers, but library and human resources. A draft of the "Internet Resources Guide" lists online library catalogs as well as supercomputers that are available through networks (7).

This movement - from unitary, local availability and use, to international access and utilization, this duality of purpose that tries to continue to provide traditional access both to local printed and to distant digitized sources effectively - will not be easily achieved. It will sometimes be conflict laden, as libraries sort out budget, personnel, training and equipment issues. Libraries and librarians will continue to find, as many already have, that the process will be cumbersome, convoluted and, to use a word borrowed, although it doesn't start with a C, from my Macintosh user friends to describe a non-functioning program, kludgy.

But this transformation, this moving from the concept of exclusivity through ownership, towards one of international information sharing and concomitant obligations, seems to be inevitable. I see it in libraries all over my country and what I have seen of Europe so far as well. Access to information is no longer only through a sheaf catalog and a shelf, but also through a terminal, a transistor and telecommunications. As two authors have noted, the

> 'library' as a place will give way to 'library' as a transparent knowledge network providing 'intelligent services to business and education through both specialized librarians and emerging information technologies. Libraries will rely heavily on computers and peripherals to facilitate electronic document imaging, publishing, telecommunications and information delivery in addition to networked collection management and reference services (8).

As librarians see information potentials, they are beginning to assert themselves in the national networking arena and are using networking power to fulfill their information mandate. I know, for example, of two library periodicals that exist only in electronic form: the "Newsletter on Serial Pricing Issues" (from Marcia Tuttle, Tuttle@UNC.Bitnet) and the "Public-Access Computer Review" (from Charles W. Bailey, Lib3@UHUPVMI.Bitnet) which deals specifically with computer systems that libraries make available for public use. Perhaps there are others and many more on special topics will certainly emerge as librarians begin to respond to the needs of electronic information management by forming their own invisible colleges for information sharing.

With the increased use of a variety of networking capabilities for information exchange and microcomputers as the tools of access to distant resources, the idea of the information expert will be expanded to be a meaningful implementation of librarian expertise. The librarian expert in Germany, whether on documentation or on Baroque literature can, with the appropriate application of microcomputer technology, become as accessible to an American librarian as a reference book on a local library shelf. Yet, experiences with the Linked Systems Project (LSP), which dates from the 1970s, suggests that in this area too, the progression may not be a revolution but a transition. In attempting to link together competing networks, the technical and other issues that surround implementation of such an imaginative and powerful concept become clearer (9).

In the Mercury Project at Carnegie-Mellon University, two writers have even determined that networking and libraries are part of a single whole. They have concluded that "the ideal electronic library is a range of services and collections made accessible through networks" (10). This implies linking and the ability to access resources at a distance that microcomputer technology combined with telecommunications services makes possible.

Yet this transformation to an electronic library may not come as quickly as some futurists anticipated or, perhaps, hoped. For example, Wilfrid Lancaster, in his Libraries and Librarians in an Age of Electronics, also projected the "de-institutionalization" of the information function and claimed that librarians will do their work without physical proximity to the library (11). But that seems unrealistic. Our honored guest, Richard De Gennaro, also thought that the forecasts of a paperless society sounded familiar to him in the early nineteen eighties. He suggested, when he heard of the new wonders that technology would bring to libraries, that

> "similar predictions were made during the early 1960s in the first flush of enthusiasm that greeted computers and electronic media" (12).

As Bernard Dixon noted recently, it may take some time to attain a paperless society because "papyrophilic practices persist pervasively" (13). Paper, at least if it is acid-free, will be with us for a long time to come. For the foreseeable future, libraries will certainly, despite works claiming that the book is dead, or that libraries will vanish, continue to have on hand materials in ever increasingly varied formats - books, CD-ROM products, digitized images, and others as yet unimagined. Therefore the custodial and service responsibilities to these varied materials, particularly including books and periodicals, will continue to exist and to serve as primary resources for sizeable numbers of our users.

Microcomputers and Information Power

As this information transformation and linking of diverse resources takes place, the rapid development of all aspects of library automation and

technology and particularly microcomputers, or as some have more adequately termed them, "Scholar's Workstations", will play key roles. Perhaps one of the reasons that microcomputers have captured the attention of so many librarians is that they have the capacity to effectively integrate the three librarianship essentials - acquiring, organizing and disseminating information - in one box that can be located on a desktop.

Initially, microcomputers were largely regarded in just this way: stand-alone devices that brought to librarians the power to manage their own information resources independently. But as microcomputer implementation has advanced, it is becoming recognized as ideal for accessing the wider, networked, information world described above. Consequently, the pull to use the full capabilities of this new tool will become irresistible and opportunities to utilize a microcomputer for information management and access - both locally and at a distance - will inevitably expand.

As Douglas C. Engelbart, currently of McDonnell Douglas Information System, but perhaps better known as the inventor of what could be called the hyper link and the holder of the patent on the mouse, put it, a microcomputer will become

> a person's 'augmented knowledge workshop' - the place in which he finds the data and tools with which he does his work, and through which he collaborates with similarly equipped workers (14).

This microcomputer concept - power through augmented and enhanced abilities to access distant resources - is one that remote session software accentuates.

Information Access and Local Area Networks

Librarians looking for ways to extend the reach of their microcomputers have examined several ways of sharing information and gaining access to distant resources and peripherals. Of course they have become effective users of distant online bibliographical databases and catalogs through standard telecommunications lines. They are, at least at the University of Wisconsin-Madison, the heaviest campus users of electronic mail. They also use a variety of network resources - Local Area Networks (LANs), Wide Area Networks (WANs), library networks as well as academic networks - to access and manage information resources effectively.

Local networking provides one way of extending a microcomputer's reach, linking diverse resources and sharing information, files, applications and peripherals. Consequently, the development of LANs has great appeal to information managers of all kinds, whether in firms, educational institutions, or libraries.

But there are several reasons why this may not be the best solution for information access. Installing a complete network, regardless of type, requires a software and hardware commitment that can be expensive. Besides, for distant users in a widespread area, a LAN may not be an effective solution due to technical limitations in distance from a central server. Finally, in order to use a node on a network, a user has to be either on a microcomputer that is part of that network or that interacts successfully with it.

There are also technical and cost issues. In a recent survey, by Infonetics, Inc., of Fortune 500 companies using LANs, there were annual operating losses in productivity totalling $3.5 million, in revenue of $600,000 and in direct support costs of $60,000 per company (15). The reason given was that few knew how to install and operate a stable LAN; therefore down time was common.

Copyright and other restrictions on the use of some CD-ROM products may make it impossible, without the payment of costly fees, to mount a CD-ROM product on a LAN. Most CD-ROM products are leased and not sold, and restrict users to one at a time. Therefore, use of a network, without paying the special fees, might be feasible, but not legal. In a trial at one part of the University of Wisconsin System, a local campus is having to pay $75,000 to mount a few years of one CD-ROM database on its network. Although this amount, when costs are spread across a system, is modest, when multiplied by the number of products available and the number of institutions that need access, it can be expensive indeed.

Remote Session Software

It is sometimes difficult to describe remote session software to those who have not used it. Perhaps one way is to make an analogy with using a dumb terminal to access a mainframe computer. Even though the

"Remote" dumb terminal may have no CPU or processing power of its own and does not house a database or other application, it can access a "Host" mainframe computer and fully use its functions and applications over a telephone, leased, or other telecommunications line. With a remote session software program made resident on a Host microcomputer, a Remote user can access it through telecommunications lines and can gain access to bibliographical or other resources, applications, or peripherals at a distance. In the same way as a dumb terminal linked to a mainframe, the Remote software user does not have to have a copy of an application or a database in order to use it.

The origins of remote session software can be traced to the early 1980s. Experts responsible for helping new microcomputer users found it useful if they could access a distant microcomputer and perfectly emulate users' problems. Since remote session software provided this complete functionality, unlike the limitations of most communications programs, and required no new equipment other than modems and telephone lines, "Remote" experts could run programs, talk new users through difficulties on their "Host" micros and even help recover "lost" data. More than one vendor found that letting a support person dial into a distant PC with a standard modem made it possible for firms to provide user assistance and compete effectively with larger organizations with more substantial support staffs (16). Since it was also possible to configure remote session software with menus, even beginning users could take advantage of its functions.

In addition, with new applications that are being developed, it is also becoming conceivable to use remote session software to access a network. But unlike a network, remote session software does not restrict a user to a specific location or node. Nor does it require the purchase of additional server equipment or the installation of additional wiring. Therefore it is potentially suitable for providing access to diverse information products, among various locations on a dispersed campus or in a large company. But, also unlike a network, the software does not allow several users, without specialized multi-tasking programs (such as Desqview), to have simultaneous access. Although usually considered as falling within either networking or communications categories of software, remote session software constitutes a special type that does not quite fit in either.

Librarians may also find that remote session software on microcomputers offers remarkable possibilities for distant information access and sharing and, in that sense, emulates the concept of transformed information librarianship. With this type of product, librarians can utilize distant resources, provide assistance to new microcomputer users, and even enhance facilities for interactive online searching sessions. The following first describes the use of remote session in several government and business offices. It then focuses on library applications at the University of Wisconsin-Madison: one on information access at a distance, including accessing CD-ROM products; another in the Kurt F. Wendt Engineering Library for helping distant users with online searching; and a third on linking together diverse microcomputers.

Specific Uses of Remote Session Software

Since its introduction, many new uses for remote session software have emerged, among them:

1. accessing special information services, such as the U.S Weather Service. A network of 15 computers is connected to a Paradox database. Remote session software lets distant users access the weather service while allowing its sysop to offer assistance if needed (17);
2. allowing government employees to work at home or for contractors to access files remotely located at an agency office. One example is the use of Carbon Copy Plus for keeping track of installed microcomputer hardware throughout Health and Human Services Departments. Unfortunately, another cited was that of attaching to the LAN at the Department of Housing and Urban Development (HUD), which was causing some security concerns (18);
3. keeping in touch with electronic mail when travelling while reducing long-distance costs (19);
4. providing a software option for connecting a Macintosh and a PC for file transfer and use of peripherals (20);
5. doing remote diagnostics for new purchasers of microcomputer hardware; at least one computer firm includes a copy of pcAnywhere III with each 80386 micro so that a technician can remotely try to solve a problem (21);

6. setting up a pseudo-network without doing the wiring. Version 3.11 of pcAnywhere is a multi-user multitasking remote software package for up to three remote microcomputers (22);
7. accessing an office LAN using remote software compatible with popular LAN operating systems. The software allows direct access to network units (23);
8. linking branch offices or other dispersed locations (24).

Varieties of Remote Session Software Products

The number of remote session software packages has been increasing because of their flexible capabilities (25). The ones I know about include:

1. pcAnywhere III and its companion product PC MacTerm (Dynamic Microprocessor Associates);
2. Timbuktu for the Macintosh (Farallon);
3. Carbon Copy Plus 5.0 (Meridian);
4. Remote 2 1.1 (Digital Communications Associates);
5. Close-up 3.0A (Norton-Lambert);
6. Co-Session 3.1C (Triton Technologies) (26).

Although it was not rated highest in all reviews, pcAnywhere was selected for trial in the library on the basis of its low price, compatibility, and reported ease of use (27).

Installation and Operation of pcAnywhere

The software consists of two parts: pcAnywhere, that runs on the Host microcomputer (the one with the resources a distant user wants to access), and ATERM (that runs on the Remote that controls the Host and provides access). The appropriate software is installed on hard drives by just copying files into a new subdirectory. What may be initially difficult to grasp is the concept that the Remote user, once connected, is using the full functionality of the Host distant resource, not of the micro attached to the keyboard that is being used. Although commands and other information appear on the Remote screen, they are those of the distant or Host micro that are being accessed.

Once the files are copied, the program on the Host is installed by moving to the correct subdirectory and typing the command "Anywhere." An interactive menu enables a user to change communications parameters, such as port name, type of connection and transmission rate easily. Changes can be saved as default values; they do not need to be set up again each time the program is used. A menu of options, accessed by moving a light bar, makes starting the program easy. Upon exiting from set-up, the program can be immediately made memory resident (it takes up about 45,000 bytes of RAM when resident) and is then waiting for a call. It can also be made memory resident by typing "Anywhere" anytime after installation is completed.

About the same procedure is used for the Remote computer with ATERM except that the function keys are used to initiate a call. It is possible to set up pcAnywhere on the Host computer, so that it will call back the remote computer, thereby transferring payment for the telecommunications access charges.

Pressing the default hot keys (Ctrl-Right Shift) provides a menu of special functions. To terminate the connection, the remote operator types "alogoff" (which stops the program but leaves it resident) or "acancel" (which terminates the program and removes it from memory of the Host computer). Once connected, pcAnywhere provides an online message on the Host about how to log off so a session can be interrupted by the Host microcomputer.

Special Features

Once operational on both a "Host" and a "Remote" microcomputer, pcAnywhere has a "Conversational" mode that opens a window on the screen and, while the program is still resident, enables users to exchange typed notes interactively.

With pcAnywhere, it is also possible to use a command that will record the exact sequence of keystrokes used and then "playback" the recorded characters in order to uncover keyboarding or other errors. After either single or multiple screens are captured, the command "aplay" displays the files. Single screen captures are analogous to a still picture, while multi-screen is comparable to a video of the screen action. It is also possible to extract shorter sequences from a longer multi-screen capture. Graphics can be stripped out and only ASCII files retained if desired. This capacity for re-running key strokes has significant potential for training new microcomputer users.

Files can be printed, using the special functions menu, on either the Host or the Remote printer. Coupling this function with file transfer, one could send a file from a Remote to the Host (or the reverse) for editing and subsequent printing on a laser printer or other special device. But it is not necessary to transfer the file to print it. The special function menu has an option that selects which printer (Host or Remote) to use. As a result, it is possible to print a file from the Host to the Remote's printer by toggling the option on the special function menu.

Problems of Remote Session Software

No product is perfect and remote session software is no exception.

1. There are security problems. Once a connection is established, the full function of a Host microcomputer is available. There could be disastrous results if an unauthorized person gained access and damaged data - to the extent of re-formatting a hard drive. A password can be implemented during set up, but once it is passed, all areas of the Host microcomputer are accessible. It seems best for communicating among trusted users or for enabling the call back function (a list of authorized users with telephone numbers) in addition to name and password.
2. Communication speed can seem slow. At 2400 bits per second, the response time on the Host computer is slower than on the Remote during normal operation. The screen takes a long time to refresh. A 9600 bps modem or communications line seems a better option. Throughput would be augmented because of enhanced speed and perhaps resolve this problem. As librarians need to transfer larger files, particularly those with graphics or images, access to faster communications lines will become increasingly important.
3. There can be a loss of control for a network manager because of the ability to dial into the network from the outside (28).
4. Some software will not work on remote session software. There have been reported difficulties with installed IRMA terminal emulation software and with some word processors that intercept keyboard commands and act on them from within the program (29).

5. Some graphics programs will not work; some remote session software can become "positively spastic when it comes to managing color and graphics" (30).

Library Uses for Remote Session Software: Sharing Information Resources

Libraries are obtaining an increasing variety of expensive information products, such as CD-ROM databases that cannot, because of prohibitive cost, be acquired in multiple copies. The appeal of electronic access to information coupled, unlike the case with online searching, with not having to pay for it directly, has attracted a steady stream of users in all libraries where CD-ROM products have been installed. Other libraries are taking the approach of purchasing licenses for the installation of mainframe databases for free access local use.

In preparation of this paper I used a CD-ROM product ("The Computer Library") and discovered the importance of information access at a distance. It could not be accessed remotely because of licensing agreements, so each use had to be through walking and waiting.

Since remote session software is essentially limited to a single user at a time, that might be a way to access a CD-ROM at a distance without violating copyright, license, or other restrictions. Initial tests of pcAnywhere to access a CD-ROM were immediately successful. It was not difficult to hook up a modem to the Host microcomputer with the CD-ROM (in this case the Library of Congress Subject Headings list) and then access it from a Remote microcomputer through a telephone line (32). The display was exactly the same as if the CD-ROM were directly available on the Remote microcomputer. The only difficulty, which the slow search time of the CD-ROM product seemed to compound, was sluggish screen refreshing. At 2400 bps - a 9600 bps modem was unavailable - it seemed to take a long time to conduct a search and get results. Use of a higher speed modem or access through the campus broadband or other high-speed line would have eased that difficulty, although users have reported that even higher speeds are needed to emulate exactly an immediate session.

The opportunity that remote session software, such as pcAnywhere, offers for sharing CD-ROM resources therefore seems technically feasible. But policy development is more important. Working out practical matters would require the cooperation of the library owning a CD-ROM and a librarian who wanted to access it. One would need to make arrangements in advance to avoid interfering with a search already in progress. In the same way, a sign would need to be posted alerting local users that it is being used from a Remote. (This would be similar, in a way, to the verbal negotiations for the use of pcAnywhere for remote online searching described below.) Perhaps other arrangements could be made to use scarce and expensive resources when libraries owning them are not open. Remote session software for accessing distant CD-ROMs might therefore depend more on the willingness of purchasers of expensive products to also allow distant access as part of the purchase arrangement than on technology.

The legality of using CD-ROM products in such an arrangement has not been tested. Since license agreements commonly specify single-user restrictions, no legal issue should be involved. But only time will tell.

Uses for Remote Session Software: Connecting a PC and a Macintosh

The microcomputer environment in American libraries is becoming increasingly more complicated due to the variety of available operating systems, networking possibilities, and other variables. Yet librarians still need to exchange files and information. pcAnywhere, and its companion product, PC MacTerm, which closely maps the PC keyboard to a Macintosh keyboard and offers file transfer capabilities that, while not perfect, are functional. Ted Silveira described the use of PC MacTerm on his Macintosh connected to pcAnywhere III running on the PC and found it "a little spooky" (33). He used WordStar 4.0, from the PC world, in a window on his Macintosh, found that the commands responded as they should and, when he quit, was "confronted by the MS-DOS version of a user interface: C > [DOS prompt]". After getting over the initial shock of seeing the DOS prompt on his Mac screen - something which would appall many Macintosh users - it was "allmost boring" because it did just what it was supposed to do.

It is also possible to hard-wire connections between one or more microcomputers. A Macintosh and a PC have been successfully linked in this way using the pcMACTERM software. (The top rate when two micros can be wired directly to each other is 56,000 bps that overcomes slow response time; but the difficulty then is limited distance between microcomputers.)

Files can be transferred either way between the two connected micros. The Remote user can enter the command "asend", which brings up an interactive file transfer menu, or use "asend [filename] to/from Host/ Remote [optional new filename]". File transfer between two PCs seemed to go smoothly, but there were difficulties trying to transfer an ASCII file from and to a Macintosh. Although text was transferred, it almost inevitably contained control and other formatting characters that had to be stripped out manually. This fault might also have been due to the use of different word processing software on the PC and on the Macintosh.

Uses for Remote Session Software: Distant Online Searching

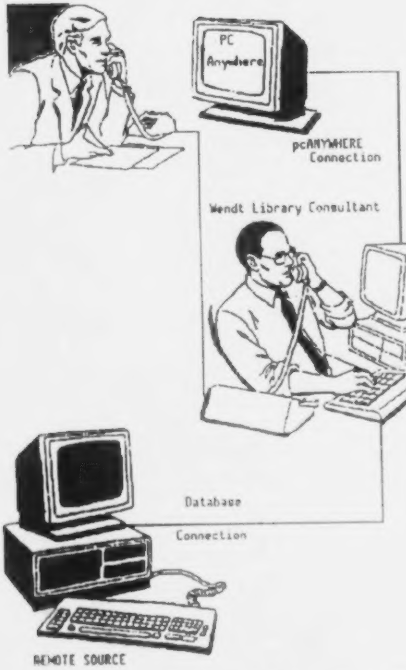
In the late 1970s several articles appeared in the computer press dealing with the ability to enhance distant access to online computer services through telephone conferencing (34). A requestor usually had to go to an information intermediary for assistance in doing an online database or other search. With remote telephone conferencing, a requestor called the intermediary, and made it possible to use an acoustic coupler - remember this was in 1979 - to record and play back online search sessions. At about the same time, others described the use of telephone conference searching using an interface unit (35). Working with a grant from the Bibliographical Center for Research, two other innovators, but still using terminals - this was before microcomputers became prevalent for online searching - tried switching terminal dominance during an online session from the database searcher to the user (36). Other attempts focused on the simultaneous search for both user and information mediator; in several cases it was pointed out that the process did not always work smoothly (37).

With the transition to microcomputers for online searching, it is possible to use such remote session programs for enhancing the search process through the use of remote session software. John Luedtke and Fran Wood of the Kurt F. Wendt Engineering Library and Jane Fox of the College of Engineering of the University of Wisconsin-Madison have devised an ingenious way to use pcAnywhere to enhance the online search process. Their library runs an information retrieval and dissemination program for industry which makes it possible for businesses in Wisconsin to gain enhanced access to technological and related information. The fee-based program has been successfully in place for many years and continues to provede a high level of interlibrary, online search, and other capabilities.

After the online searchers at Wendt and the business or company seeking an interactive online search have agreed to a mutually acceptable time, the procedure takes place as follows (using two modems and three telephone lines):

1. The business requesting the search connects to the Wendt library's microcomputer through one telephone line using pcAnywhere software;
2. The Wendt library uses communications software (ProComm) and the second telephone line to connect to the database vendor, such as BRS, Dialog or others;
3. The library and the business are in voice contact on a third telephone line as the search proceeds.

Since the business or company requesting the search can, through the use of pcAnywhere, see everything that is taking place on the screen of the Host microcomputer, it is possible to verbally refine the search by suggesting additional descriptors or identifying an item that is needed. The online searcher and the researcher, although physically distant, create a search together. (Please see following illustration.)



2 Using pcANYWHERE at the Wendt Library for Database Searching

Uses for Remote Session Software: Managing Locally Created Databases

Both scholars and librarians are amassing large quantities of bibliographical and other data because of comparative ease of access and downloading of information in electronic formats that microcomputers have made possible. Using databases such as askSam, that has the capacity for accepting unformatted data of any length or ASCII type, or database programs such as Pro-Cite and its accompanying filters or “Biblio-Links“, that have the capacity for organizing downloads from various online bibliographical services, scholars have begun to create miniature - sometimes not so miniature - online catalogs. These databases are used frequently by scientists to manage reprint files, by librarians for ready reference questions, or by other organizations for a variety of purposes.

One of the difficulties with locally created databases is that they are not easily accessible at a distance since many will not run using standard communications programs. Remote session software can be used to provide just the type of distant access that is needed. askSam is currently being used at Wisconsin to manage a locally created bibliographic database on microcomputers and library applications; although located on one 80386 microcomputer, it is also accessible from a distance using pcAnywhere. Instead of being limited to one user, it can be searched, edited, and printed at a distance. This capacity extends both microcomputer and database functions and makes it possible for distant users to access the latest imformation instead of having to wait for distribution of disks.

Since it is a locally created database and lacks the restrictions of CD-ROM products, it could also be available on a network, but since the microcomputer is also used intensively by an individual librarian, rather than being on an independent file server, that could create security and other difficulties that the password structure of pcAnywhere helps obviate. With the growing capacity of microcomputer processing power and storage capabilities, microcomputer databases of size and power that had previously been restricted to mainframe functions, become distinct possibilities.

Uses for Remote Session Software: Teaching Microcomputer Use in Libraries

As its origins suggest, and as described above, it is also possible to use pcAnywhere for teaching purposes in libraries. With the number of skilled microcomputer users still limited, the ability to use pcAnywhere or another remote session software package for training cannot be underestimated. Although the price of installing the software, when multiplied by the number of users on a large campus, can be initially high, expertise costs more and needs to be generously shared if libraries are to implement microcomputer technology successfully. Several businesses (described above) are using remote session software for diagnostics and assistance; libraries might find it useful to emulate successful practices elsewhere.

Another use is setting up classroom teaching situations. In microcomputer classes, a teacher must be able to access the microcomputers of any student at any time in order to determine if there are problems. Usually a LAN is installed for just this purpose. But the journalism microcomputer laboratory at Wisconsin is using Timbuktu software for teaching students to use Macintosh microcomputers. The teacher is able to use the program to switch from one machine to another to determine exactly what a student is doing and to answer questions from a central location, thereby avoiding the expense of installing a full-blown LAN.

Conclusions

This paper has described remote session software and placed it within the context of a broader concept of the use of microcomputers and of libraries themselves as both reservoirs of local information and gateways to information at a distance. As librarians began to practice library science, then library and information science, they seemed to be looking for rationales for being regarded as scientific professionals. Yet this approach could be considered outmoded, for librarians have a natural role as information acquirers, mediators, and providers that establishes them, if they will accept these responsibilities, in prominent positions in an information society.

We already have examples of successful models of database management. Librarians have taken the lead in many American universities as those best able to build, maintain, and provide service to the largest and most complex bibliographical databases on individual campuses. Online catalog development, while neither complete nor comprehensive, is still a potential model for database developments elsewhere.

As libraries and librarians make the transformation to the conception of distant as well as local information management, they may need to bring with them other elements of society in their redefinition of information. Universities in the United States and elsewhere commonly require that students be computer literate. Too often this is translated into being able to word process, manage a spreadsheet or do simple programming. Gordon Gee and Patricia Breivik have defined librarians' roles within this broader information context:

> Underlying the new challenges of the Information Society then is the need to foster the development of information-literate [n.b., not computer-literate] people... [for it is the ability to gather, organize and

> re-formulate new knowledge that will be the key to higher education's response in the Information Age (38).

If one focuses on information, then library education should not parallel national trends in focusing on the tools instead of their functions, on the systems and not their contents. Instead, an emphasis on information access and management, not a narrow conception of techno-librarianship, seems more appropriate (39).

Microcomputers coupled with such products as remote session software offer new information capabilities and are worth exploring in their application to the model of information managers of distant resources that was elaborated in the first part of the paper. But policy issues concerning access and use of resources such as CD-ROM products from a distance need to evolve as well.

Although not within the context of this paper, I would also like to extend the ideas of librarians' roles one step further. This conceptualization would imagine information and its use, when judged by time allocation at least, as having a pyramidal shape. There seemed, as I was developing this paper, to be an inverse pyramid of information: I used a diverse variety of printed, online, and CD-ROM information both on site and at a distance. But the proportion of time allocated for each function - acquisition, organization, and preparation for dissemination - were dissimilar. Accessing remote sources, including walking to them, took a few hours: in less than one I had downloaded the equivalent of 1,000,000 bytes of printed information. Organizing the million bytes took about three times as long as acquiring it. And preparing it for dissemination in a usable format three times that yet again.

Librarians as managers of gateways to information and transformed information itself in the 1990s may find that it will be easier, once technological barriers are overcome, to gather than it is to organize; to organize than to make information coherent; to bring coherence than to create knowledge. The central problem, once access questions are resolved, will continue to shift from the ability to acquire resources, to the concept of managing and mediating them and applying them to the problems of society. In T. S. Eliot's words,

> Where is the Life we have lost in living?
> Where is the wisdom we have lost in knowledge?
> Where is the knowledge we have lost in information? (40)

Librarians of the future must be technologically skilled if they are to be able to successfully implement the information transformation that combines traditional with digital access. But that skill also must be combined with subject competence that will enable them to fulfill a mediators role to the needs of the scholarly community (41). While microcomputers and remote session software can be elements in this changing role, they are, regardless of technological virtuosity, as tools and techniques, a means to an information end, but not the end in themselves.

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The Possibility of Displaying Special Characters and the Combination of Standard and Diacritical Characters in Microcomputers

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The Possibility of Displaying Special Characters and the Combination of Standard and Diacritical Characters in Microcomputers

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Abstract

Based on the tremendous increase in the performance of microcomputers at a simultaneously more convenient price-efficiency-situation the idea was born to use microcomputers instead of display terminals.

This application is impossible in library systems until now due to the necessity to use special and diacritical characters in such systems.

The talk will show the possibilities to implement special and diacritical characters on a microcomputer.

After definition of the terms 'microcomputer', 'diacritical', 'special', and 'standard character' will follow an explanation of the microcomputer elements which are relevant for the above-mentioned characters.

The talk will inform about some technical aspects related to the arising tasks.

Topics will be:

- the strategy of the free combination of standard and diacritical characters versus a large character set
- a software solution
- a hardware solution
- advantages and disadvantages of the above-mentioned points.

The talk will end with a comparison of display terminal and microcomputer.

The Possibility of Displaying Special Characters and the Combination of Standard and Diacritical Characters in Microcomputers

Based on the tremendous increase in the performance of microcomputers at a simultaneously more convenient price to efficiency situation the idea was born to use microcomputers instead of display terminals.

This application is not possible in library systems until now due to the necessity to use special and diacritical characters in such systems.

This paper will show the possibilities to implement special and diacritical characters in microcomputers.

First of all, the main terms of this paper will be explained, i.e.:

- Microcomputer
- Diacritical character
- Standard character
- Special character

In this talk a microcomputer means an IBM/AT compatible computer running under MS-DOS. There are of course a lot of other microcomputers which have a high performance (e.g. VME-computers, NeXT, Acorn Archimedes or the Apple MacIntosh, all based or mostly based on Motorolas 68000-series processors, the DEC PDP 11, the Commodore C64 and C128 etc.) and also more powerful than other MS-DOS operating systems (e.g. OS/2, PCMOS), but there are strong arguments, for example a large dissemination, an excellent price to performance situation and a broad palette of software for using an IBM/AT compatible under MS-DOS.

However, the ideas presented here are not restricted to an IBM/AT compatible computer; this machine was choosen for its low cost.

Looking at the computer market for IBM/AT compatibles, there is a convenient price-efficiency-situation which leads to a large dissemination and vice versa. This (coupled) situation leads to the fact that we get

- spare parts and service all around the world
  (third maintenance parties)

- very much hardware available

Furthermore, these machines

- have an open hardware concept, i. e. hardware extension is very easy
- are, as a matter of fact, an industrial standard
- are faster than an IBM/XT-compatible
- have more hardware options than an IBM/XT compatible

The reasons for using MS-DOS as operating system are as follows:

- A lot of development tools are available for this operating system, for example:
  - Compilers (Turbo Pascal, FORTRAN,...)
  - Interpreters (BASICA, GWBASIC,...)
  - Editors (Edit, WordStar,...)
  - Databases (Clipper)
  - Tools (sev. Toolboxes)
  - Assemblers (MASM, TASM,...)
- Application software is also available, e. g.:
  - Word processors (Word, Witchpen, Starwriter,...)
  - Integrated software (Framework, Lotus123, Symphony,...)
  - omputer graphics (Harvard graphics, Paint, GEM,...)
  - Spreadsheets (Multiplan, BoingCalc, Supercalc,...)
  - Clipboards (Sidekick plus,...)
  - Databases (dBASE, Foxbase,...)
- Available utility software is for example:
  - Norton utilities
  - PC Tools
  - Public Domain Software (Screensaver,...)
- OS/2 has a MS-DOS-Box

Looking at the hardware concept of a standard AT, we can see the reasons why these machines are so powerful:

The CPU is an Intel 80286, and there is a socket for an optional Coprocessor Intel 80287. This chip makes this machine useful for tasks doing number crunching.

The RAM consists of 640 KB. Mostly 120nsec-RAMs are used which leads to possible clock-rates of at least 8 mhz without wait states.

Optional RAM is available for all PCs as so-called "expanded memory" and for ATs as "extended memory".

Two nested 8259A interrupt controllers allow fifteen hardware interrupts while the XT has only eight hardware interrupts.

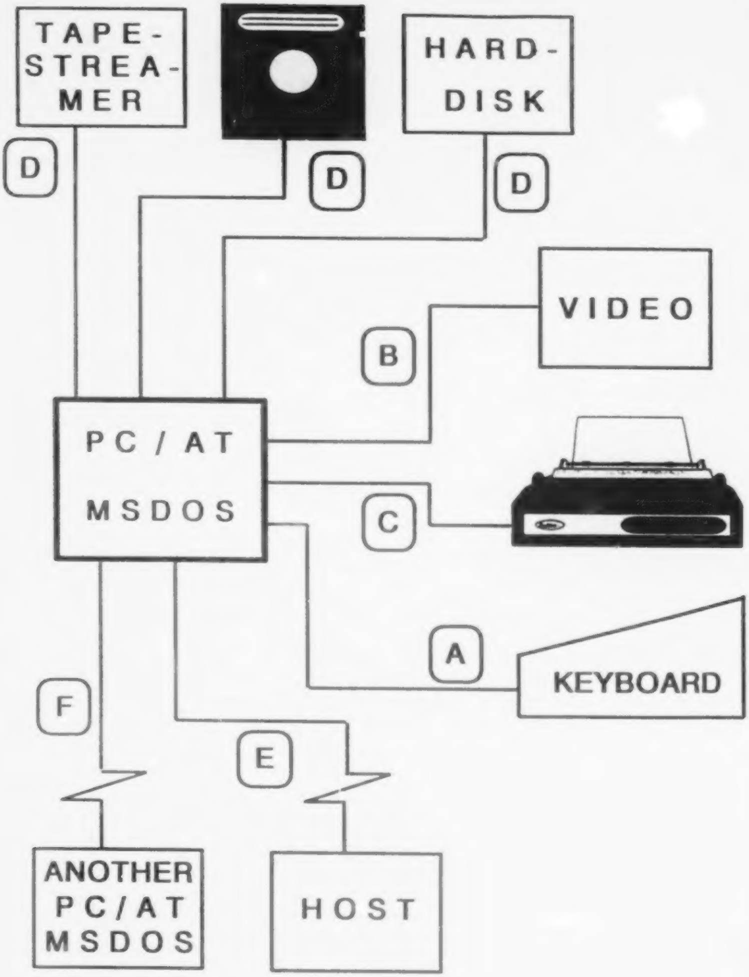
Due to the Module concept with five long and three short slots these machines are very flexible. Therefore, extensions such as Transputer boards, D/A and A/D I/O, memory expansion, several interfaces can be used.

MDA, CGA, EGA, VGA or Hercules cards can be obtained as video cards, needing one short slot. The VGA card often includes all other video possibilities.

The USUAL interfaces are at least one serial (RS 232) for mouse, modem etc., and one parallel (Centronics) normally used for printers (length up to 2m!).

The POSSIBLE interfaces are network cards for Ethernet, Arcnet etc., RS 422, IEEE bus. In principle, all interfaces can be connected to the system.

The standard operating system of an AT is MS-DOS which has its origins in CP/M but has become an industrial standard.


TAPE-STREAMER
HARD-DISK
D
D
D
VIDEO
B
PC / AT
MSDOS
C
A
KEYBOARD
F
E
ANOTHER PC/AT MSDOS
HOST

The definition of a diacritical character is taken from the German encyclopedia “dtv Brockhaus“:

A diacritical character [gr. 'distinguishing' character] is a character over or under a letter in form of accent, hook, minus, slash, tilde, point etc. which corresponds to a sound change. So, in French, a 'c' before 'a', 'u' and 'o' is pronounced as [k], but ç is pronounced as [s].
Example: François

As examples for diacritical character we can look at the Spanish word Señor, where 'n' + '˜' = 'ñ' (diacritical character is the '˜') or the Danish word Århus, where 'A' + '°' = 'Å' (diacritical character is the '°').

From these examples we obtain the following

> Rule: A diacritical character cannot stand alone.
> It is a kind of a symbiont.

The definition of standard characters is more simple:

While our interest is only in displayable characters, standard characters are the following:

Space ! “ # $ % & ´ ( ) * + , - . / ,
0 .... 9 : ; < = > ? @ A ... Z [\ ]
^ ` a ... z { | } ¯ Ä Ö Ü ä ö ü ß

The definition of special characters is based on the DIN 31624, Part 2, enhanced by A-E- and O-E-ligatures.

However, on our system each character of the IBM character set is available, or, in more general terms, each character of the system on which the herein described solution is implemented will be available.

The picture shows a computer and extensions: Keyboard, video output, printer, mass storage devices, other computers under the same operating system, and host computers.

Let's consider the input of data via keyboard. The main demands are

- the standard keyboard of the used machine, enhanced by the wanted abilities, is used,
- full functionality is kept, which means that all programs running on a standard machine can also run on this “diacritical computer“

- those who are used to work on a standard machine can go on using their known keyboard.

For diacritical and some special characters there shall be a "third plane" keyboard assignment which matches the standard assignment for diacritical terminals, as far as possible.

This "third plane assignment" is engraved in the keytops in a different colour than the standard assignment. An "escape key" is also engraved in this colour.

Any special (displayable) character is defined on the standard keyboard. It will not be defined a second time on the "third plane" to avoid operating system problems (e.g. ' \' at pathes).

The input of a diacritical character is performed in the same way known for standard diacritical terminals.
Example:
Input of the word "Reïs"

<R> + <Shft> <E> <DIA> <E> <DIA> <#> <S>

getting the trema	getting the Turkish i

Description: By pressing the <DIA>-key, the system is switched to the "third plane" assignment. Pressing a second key causes the system to go back to the standard key assignment (discussion of display later).

As a nice side effect, we have a free programmable keyboard processor in our system. Using this processor, a sequence of any characters (including cursor movement characters) can be assigned to any key. In the existing version, this may be dangerous, for it is possible to assign, for example, a 'J' to the <Return>-key.

Next, we consider the output of data from the computer via video. We decided to use a VGA video card for our system. The reasons are that this is the new standard for PCs nowadays and that we expect compatibility problems with future programs, therefore. Furthermore, the prices for VGA cards decreased considerably.

There are three kinds of characters: Standard characters, special characters, and diacritical characters:

- Standard characters can be displayed using DOS functions.
- Special characters can be divided in two groups:
  Those who are available on a standard keyboard and those who are not. Each character of the first group can be displayed in the same way as standard characters. The characters of the second group can only be displayed using an extra character font.
- Considering the display of diacritical characters, we remember the rule "A diacritical character cannot stand alone". While using this rule, we ought to have a more abstract view of the things we are looking at:

  If there is a set of k standard and special characters, m diacritical characters and a character font of j bytes per character, there are two possibilities to display all possible combinations of these characters:

  The first possibility is to gather all possible combinations of standard, special and diacritical characters within one font. We would use a k*m - matrix with matrix elements of j bytes.

  The rows of our matrix are the increasing standard special characters, the lines are the increasing diacritical characters. So we will need for this model a character generator of j * m * k bytes.

  For the second possibility we use a k-vector and an m-vector; the vector elements are j bytes long as the matrix elements in our assumption before. Further, we assume to have the possibility of free combination of the elements of these two vectors, i.e. we can combine each element of the k-vector with each element of the m-vector. For this model we would need a character generator of j * (k + m) bytes. The difference between these two character fonts would be j*(k*(m-1)-m) bytes. The later described possibility would be the "natural" solution. It is protected by a patent hold by Softec GmbH, Quickborn.

Now let's take fixed numbers: 20 diacritical characters, 220 standard and special characters, 16 byte per character (VGA-standard). For the first model we would need a character font of 70400 bytes for character fonts, for the second model there would be need of a character font of 3840 bytes. The difference is 66560 bytes (more than 1 segment !).

Cooperating with Softec, Krupp MaK uses the solution based on the free combination of characters. The solution can be implemented in two ways:

First, standard hardware can be used. In this case, text output to the screen has to be emulated in graphic mode.

The second possibility is a modification of the VGA hardware in such a way that the mixing of characters is done by hardware.

Standard hardware has the advantage that hardware modification is not necessary. But there are two disadvantages. First, there is less performance in video output and, furthermore, the cursor must be emulated by software.

The modification of the VGA hardware has the disadvantage of the effort of such a modification. The advantages of such a solution are that there is no loss of velocity, the cursor will be managed by the system and all standard programs working in text mode will run on the PC.

The software solution was demonstrated during this symposium. A hardware implementation is prepared now and will be released soon.

Both solutions have some common features, as follows:

1. It is possible to switch between 'composed' and 'non composed' mode
1.1 In 'non-composed' mode it is possible to switch between two further modes to display the text.
1.2 In 'composed' mode a 'delete-cursor' can be displayed optionally.
2. In all modes it is possible to display an 'escape-delete-cursor' optionally.

The next point is output of data from the PC via printer. This was implemented similar to the output of data via video. Using the method of free combination, there are two possibilities to print a line:

First, it is possible to print a backspace after each single character and to overwrite the character afterwards with the corresponding diacritical character (if there is one).

The alternative is the overprinting of complete lines.

With respect to the printer mechanics, the second method was chosen.

The bidirectional data exchange with floppy, tape streamer or hard disc can be done in the same way as described for the keyboard. The 'diacritical escape key' is assigned to a number between 0 and 255; now the information can be handled as an 8-bit-ASCII-file. In this way we defined a file format for additional diacritical and special characters. This file format implements full network capability required for distributed systems.

The bidirectional data exchange with other computers or computer systems has to be handled by a standard protocol. Independent of the chosen file format any desired protocol can be realized by translation rules, e. g. the problems of using the 'German' characters or the US ASCII character set ([,], {, },| against Ä, Ö, Ü, ä, ö, ü, ß) does not appear.

Bidirectional data exchange with another PC can be reduced to the definition of a file format, and the exchange can be done by floppy disc, RS232, Ethernet, Arcnet, tape streamer, optical discs, whatever you want.

In conclusion, we can see that it is possible to use relative powerful microcomputers instead of display terminals while the prices for these systems are comparable.

The application of such an instrument is expected to be a useful tool in the coming integration of the European Community in the year 1992.

Conference Summary

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Conference Summary

I was very flattered to be asked to provide the conference summary for this year's Essen symposium; and particularly pleased because Richard De Gennaro was the honoured guest at the 1989 Symposium; he is highly regarded in North America, especially by those of us connected with the University of Guelph Library. However, flattered as I was, I did wonder what qualifications I might bring to this assignment, aside from representing the same continent as our guest. Then, as I listened to comments and remarks about their various versions of the conference language made by the speakers themselves, another selection criterion became clear - as a Canadian, I, of course, speak English without an accent! And, as long as I could speak in UPPER CASE (thus avoiding all diacritics), and refrain from ending my sentences and phrases with the phrase typical to Canadians ("eh?" or "eh!"), everything might come out alright!

At this point, there was a brief test (which does not bear repeating here) for all conference attendees, to highlight their retention level of some of the salient terms and phrases in the good information that had been presented throughout the three and one-half days of the symposium.)

Now I would like to present a very personal view of this year's Essen Symposium on Developments in Microcomputing - Discovering New Opportunities for Libraries in the 1990's. This 12th symposium was an "ideas" and "issues" conference - opening eyes and ears and minds to new ideas; challenging us to take all these things we have heard and seen, to transpose and to build on them; to expand, to emulate and to innovate. First, there was a real-time overview of what is happening right now, provided for us by David Raitt. We will look forward to hearing more about this survey later; I suspect that the unsolicited and unedited comments from the survey respondents (if published) may be almost as interesting as the analyses of the questionnaire data.

It was interesting to hear about projects in public libraries in Israel from Shmuel Sever, and then to move to applications and future plans for major academic research library systems, such as those at Heidelberg and Oxford presented by Ronald Schmidt and David Price; followed by some management applications provided by Mohammed Aman. I appreciated particularly the recognition that institutional politics and psychology are important and that people must be assisted in becoming at ease with new technologies.

We heard about communications - linking and connection, within institutions or units via a local area network, and then, from Morton Hein, a very concise and clear summary of what OSI (Open Systems Interconnection) might mean to us and why we should all be paying attention to developments in cooperation in this area.

Following these presentations, a more specific focus was given by Bernhard Eversberg (in his presentation of Allegro) and by Kathleen Noerr in her talk on data conversion; after which, Reimer Auls discussed some technical considerations related to social characters, and combing standard and diacritical characters.

Heinz Habermann described some detailed and specific questions about data exchange, and the importance of importing and exporting data (which would be useful even if or when we change systems within an institution).

The next grouping includes the opportunities presented by hypermedia and multimedia technologies - beginning with Ching-chih Chen's presentation, which opened the symposium, describing the Emperor I Project - and Susan Martin's description of the NCLI8 project. The presentation by Rolf-Dieter Schmid on interactive optical disk systems was particularly useful in presenting opportunities for course-supporting packages for undergraduate courses in Fine Arts; or for graduate programs in fields such as Landscape Architecture. And then, the practical and focussed application for manuscript and rare book collections presented by Hans-Albrecht Koch and Armin Hetzer.

And finally, about "Issues": Eberhard Janke's paper on standards and standards libraries and OSI brought home to us the importance of standards; and then Erwin Welsch raised the issues concerning in-house use on local microcomputers of bibliographic information that had been downloaded from distant host, and he also touched on copyright and ownership questions. This last is especially important to Canadian librarians because our own copyright legislation is just now going through the federal parliamentary process, somewhat later than most of the other signatories to the Bern convention.

On behalf of all the Symposium attendees, I would like to thank all the participating vendors - not only for their very interesting and informative exhibits - but also for their kindness and generosity in sponsoring the Symposium receptions. We should also add our special thanks to Dr. Ahmed Helal and all the members of the Essen group who make these Symposiums possible.

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